

Telit Modules Software User Guide

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This document is related to the following Telit Modules:

PRODUCT
GT863-PY
GT864-QUAD
GT864-PY
GM862-GPS
GC864-QUAD
GC864-DUAL
GC864-QUAD V2
GC864-DUAL V2
GE863-QUAD
GE863-GPS
GE863-SIM
GE863-PRO ³
GE864-QUAD
GE864-QUAD V2
GE864-DUAL V2
GE864-QUAD Automotive V2
GE864-QUAD Atex
GE865-QUAD
GL865-DUAL
GL865-QUAD

Tab. 1: Products table



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AT Commands list in alphabetical order

The following list shows the AT commands covered by this User Guide. The number reported close to each command indicates the page of the first AT command occurrence. Refer to [1] to know which product supports the interested AT command.

+++	48	AT#SNUM.....	82	AT+CMGL.....	116
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AT#BND	18	AT\$GPSACP	169	AT+CMGW.....	107
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AT#DTMF.....	84	AT\$GPS SAV.....	169	AT+CPBS.....	55
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1. Introduction

1.1. Scope

The purpose of this document is to describe some standard and proprietary AT commands supported by **Telit modules**. The most important module functions are taken into consideration and for each one of them a proper AT command is described. Some useful services and features of the GSM Network supported by the **Telit modules** are also described and examples of AT command sequences are provided.



NOTE:

The AT command sequences described in this document are not mandatory, and this information should be used as an introduction in the AT command use.

All detailed information about available AT commands and **Telit modules** features can be found in the documents [1] and [2].

1.2. Document Organization

This User Guide contains the following chapters:

- “Chapter 1: Introduction”: Provides a scope for this User Guide, text conventions, and related documents.
- “Chapter 2: Basic Operations”: Describes basic AT command sequences to perform actions like, for example, turning the module on and off and establishing calls.
- “Chapter 3: Advanced Operations”: Describes AT command sequences that allow you to perform more complex actions like, for example, accessing the phonebook and managing calls and SMSs.
- “Chapter 4: GPRS Operations”: Provides an introduction to using the GPRS functions of the module.
- “Chapter 5: GPS Operations”: Provides a detailed description of GPS operations for modules supporting GPS functions.
- “Chapter 6: Service and Firmware Update”: Provides a step-by-step instruction for service and firmware upgrade.
- “Chapter 7: Acronyms and Abbreviations”: Provides a definition for all the acronyms and abbreviations used in this document.



1.3. Text Conventions



Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.



Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.



Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

FORMAT	CONTENT
Courier New, Bold	Command input
Courier New	Command output



1.4. Related Documents

- [1] AT Commands Reference Guide, Telit document: 80000ST10025a
- [2] Refer to the specific "Telit Product Description" document
- [3] Refer to the specific "Telit Hardware User Guide" document
- [4] Easy GPRS User Guide, Telit document: 80000ST10028
- [5] ETSI GSM 07.07
- [6] EVK2 User Guide, Telit document: 1v0300704
- [7] ETSI GSM 03.38
- [8] NMEA-0183 Standard For Interfacing Marine Electronic Devices
- [9] Device Requirements AT&T, Document Number 13340
- [10] WGS 84 IMPLEMENTATION MANUAL, EUROCONTROL and IfEN
- [11] NMEA Reference Manual, SiRF Technology, Inc.
- [12] ITU-T Recommendation E.164
- [13] ETSI GSM 11.11
- [14] ITU-T Recommendation V.24
- [15] UC864/CC864 Windows 2000, XP and Vista Driver,
Telit document: 1v0200903.
- [16] ETSI GSM 11.14



1.5. Document Change Log

Revision	Date	Changes
ISSUE #0	2008-08-01	First release
ISSUE #1	2009-01-15	Updated P/N list Added GC864PY and GE864-QUAD-Automotive to the list of modules concerned by the present document Added comment on setting the working bands Updated delay time for wake-up from sleep mode Update Diagram 3.5.2 Deleted § 6.1.2 Tfi Tool
ISSUE #2	2009-09-29	Added: AT Commands list, AT+CGSMS, AT+CAPD Updated: GE family table, Tab. 2, reference [1], Tab. 4 Changed +ALARM into +CALA on § 3.9.5.7
ISSUE#3	2010-01-26	Added Ge864-QUAD Atex, GE864QUAD Antenna, GE863 Pro3 128/64, GE864-QUAD V2 and GE864-QUAD AUTOMOTIVE V2
ISSUE#4	2010-06-28	Added § 2.9 RTS detection. Updated § 3.7.1, § 3.7.2, § 1.4, § 6.1.1 and Tab. 4. Updated Tab. 1, Tab. 2, Tab. 6
ISSUE#5	2010-10-04	Added GE865-DUAL to applicability table
ISSUE#6	2011-03-10	Added the following commands: AT#DTMF, AT#CSURV, AT#CSURVB, AT#QSS, AT#SII, AT#CODECINFO, AT#CODEC, AT#ENCALG, AT+CSNS, AT#SIMDET, AT#NITZ, AT+CSIM, AT#CMGLCONCINDEX



2. Basic Operations

For AT command syntax, refer to [1].

2.1. AT Interface Style

For information about AT Interface Backward Compatibility and #SELINT Factory Setting for each type of **Telit module** covered by this guide refer to document [1]. For reader convenience the Tab. 2 summarizes the Module Families in relation with the supported AT Interface Style: 0, 1 and 2. The switching among the supported AT Interface Styles is performed with the **#SELINT** AT command.

Families & Modules	AT Interface Style supported		
	Factory Setting		
GM Family (Modem)			
GM862-QUAD	0	1	2
GM862-QUAD-PY	0	1	2
GM862-GPS	0	1	2
GC Family (Compact)			
GC864-QUAD	0	1	2
GC684-QUAD /w SIM holder	0	1	2
GC864-PY	0	1	2
GC864-DUAL	-	-	2
GC864-QUAD V2	0	1	2
GC864-QUAD V2 with SIM holder	0	1	2
GC864-DUAL V2	-	-	2
GE Family (Embedded)			
GE863-QUAD	0	1	2
GE863-GPS	0	1	2
GE863-PY	0	1	2
GE863- SIM	0	1	2
GE863- PRO ³	-	-	2
GE863- PRO ³ with Linux	-	-	2
GE864-QUAD	0	1	2
GE864-QUAD V2	0	1	2
GE864-DUAL V2	0	1	2
GE864-QUAD Automotive V2	-	-	2
GE864-PY	0	1	2
GE864-QUAD Automotive	-	-	2



Families & Modules	AT Interface Style supported		
	Factory Setting		
GE864-QUAD ATEX	-	-	2
GE865-QUAD	-	-	2
GT Family (Terminal)			
GT863-PY	0	1	2
GT864-QUAD	0	1	2
GT864-PY	0	1	2

Tab. 2: Modules and supported AT Interface Styles



NOTE:

The AT commands described in this guide refer to the #SELINT 2 AT Interface Style.

2.2. Turning ON the Module

To get more information about procedure and timing refer to [3].

2.3. Turning OFF the Module

To get more information about procedure and timing refer to [3].

2.3.1. Software Shutdown

Issue the following command:

AT#SHDN

OK

During shutdown the module executes the following actions:

- Detachment from the network
- Module Power OFF

To get more information about procedure and timing refer to [3].



2.4. First Telit Module Approach

After a proper Power ON sequence the **Telit module** is ready to receive AT commands on its Serial Port. Some functions have to be checked in order to be sure that the module is ready to send and receive calls and SMS.

2.4.1. Telit Module Identification

Use the following AT command to verify if the connection between DTE and **Telit module** (DCE) is working. The current serial port speed setting is Autobauding (Factory Setting):

```
AT  
OK
```

Use the following AT commands to verify the Software version and **Telit module** identification:

- **AT+CGMR**: Returns the Software version information
- **AT+CGMM**: Returns the **Telit Module** identification

Examples

Checking the software version

```
AT+CGMR  
10.00.004  
OK
```

Checking the module identification

```
AT+CGMM  
GM862-QUAD  
OK
```

2.4.2. Band Configuration

Use the following AT command to select the current band range:

```
AT#BND=[ <band> ] ;
```

The range of parameter <band> depends on the SELINT configuration, see [1] for details.

Examples

```
AT#BND=[ 0 ]
```

Selected band: GSM 900MHz + DCS 1800MHz.



Use the following AT command to enable/disable the automatic band selection at power-on.:

AT#AUTOBND=[<value>] ;

The range of parameter <value> depends on the SELINT configuration, see [1] for details.

The module is a quad band device, but in any case it is necessary to set the correct working bands, see [1] for details.

2.4.3. Enabling the Extended Error Result codes

To enable the error report in numerical format for +Cxxx commands, issue the following command:

AT+CMEE=1

OK

To enable the error report in verbose format for +Cxxx commands, issue the following command:

AT+CMEE=2

OK

2.4.4. Second Interface Instance

Use the following AT command to activate one of the three AT instances available and assign it to the ASC1 serial port, see fig. 1.

AT#SII = <inst>

For parameter description, refer to [1].

Examples

AT#SII?

#SII: 0 Trace service is connected to ASC1, see fig. 1

OK

AT#SII=1

ASC1 is disconnected from Trace service
and connected to AT1 Parser.

ASC0 is still connected to AT0 Parser.



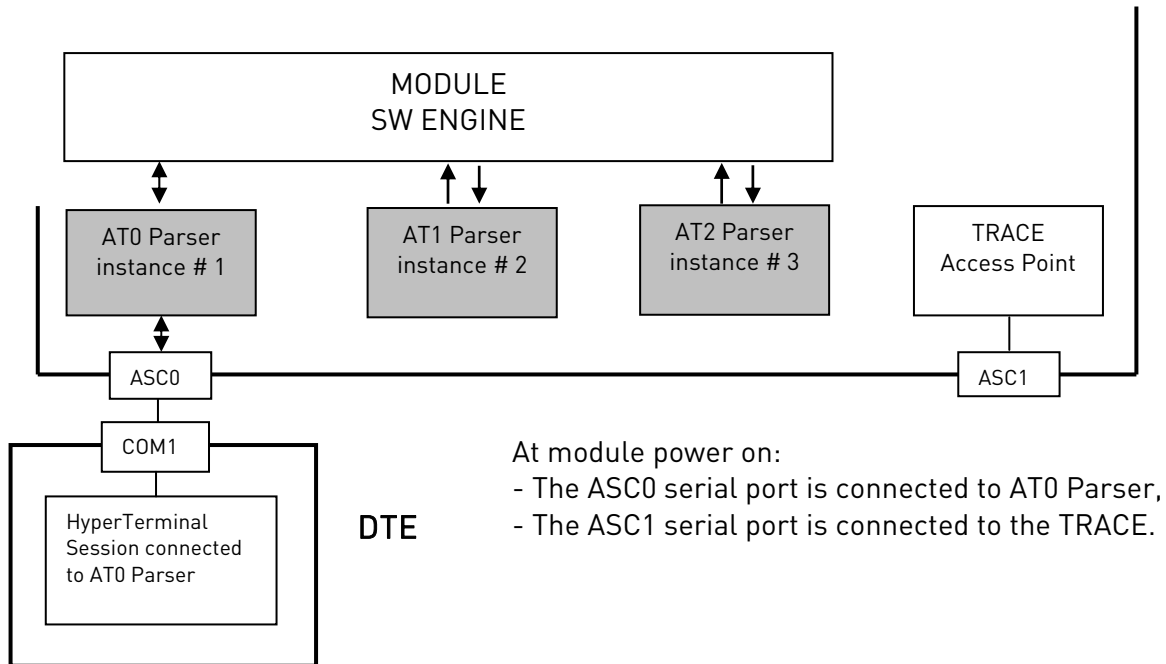


fig. 1: AT0, AT1, AT2 Parsers



2.4.5. Serial Port Speed Configuration

Use the following AT command to specify the Serial Port speed of the **Telit module** (DCE):

AT+IPR=<rate>

For a detailed description of parameters and possible responses, refer to [1].

Examples

Checking the current serial port speed setting (Factory Setting = autobauding):

AT+IPR?

+IPR: 0

OK

Checking the serial port speed range:

AT+IPR=?

+IPR:

(0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200), (0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200)

OK

Setting up the serial port speed of the module (DCE) to 38400 bps:

AT+IPR=38400

OK

AT&W0 store the setting on profile 0

OK

AT&P0 at Power ON use profile 0

OK

Checking the current serial port speed:



NOTE:

Before entering the following AT command set up the DTE serial port to 38400 bps.

AT+IPR?

+IPR: 38400

OK



2.4.6. AT Command Interface selection

Use the following AT command to check the current AT Interface Style:

AT#SELINT?

For details on the possible responses, refer to [1].

Examples

After powering ON the module, checking the current AT Command Interface:

AT#SELINT?

#SELINT: 0

OK

Checking the AT Command Interfaces Set supported:

AT#SELINT=?

#SELINT: (0-2)

OK

Selecting an AT Command Interface Set:

AT#SELINT=2

OK

Select a wrong AT Command Interface Set just to see the response:

AT#SELINT=3

ERROR

Checking which AT Command Interface is active:

AT#SELINT?

#SELINT: 2

OK

2.4.7. SIM Checking

2.4.7.1. Query SIM presence and status

Issue the following command:

AT+CPIN?

Responses:

- +CPIN: XXXX (Refer to [1] for the details.)
OK
- ERROR
- See table below:



Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

The SIM is not inserted into Telit Module. Extended error result code is not enabled. Checking if PIN code is needed, just to see the response command:

AT+CPIN?

ERROR

The SIM is not inserted into Telit Module. Verbose extended error result code is enabled. Checking if PIN code is needed, just to see the response command:

AT+CPIN?

+CME ERROR: SIM not inserted

The SIM is not inserted into Telit Module. Numerical extended error result code is enabled. Checking if PIN code is needed, just to see the response command:

AT+CPIN?

+CME ERROR: 10

Inserting the SIM into Telit Module and checking if PIN code is needed:

AT+CPIN?

+CPIN: SIM PIN

OK

2.4.7.2. SIM PIN

Issue the following command:

AT+CPIN=<pin>

For parameter description, refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]



Examples

A wrong PIN code is entered. Extended error result is not enabled.

AT+CPIN=1235

ERROR

A right PIN code is entered:

AT+CPIN=1234

OK

A wrong PIN code is entered. Verbose extended error result code is enabled:

1. Enabling Verbose extended error result code:

AT+CMEE=2

OK

2. Entering a wrong PIN code:

AT+CPIN=1235

+CME ERROR: incorrect password.



NOTE:

After 3 failed attempts SIM PIN is no longer requested and the SIM is locked. Use SIM PUK to enter a new SIM PIN and unlock the SIM.

2.4.7.3. SIM PUK

Issue the following command:

AT+CPIN=<pin> [, <newpin>]

For parameter description, refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]





TIP:

After 10 failed attempts to enter SIM PUK code, the SIM Card is locked and no longer available.

2.4.7.4. Query SIM Status

Use the following AT command to enable/disable the Query SIM Status unsolicited indication.

AT#QSS = <mode>

For parameter description, refer to [1].

Example 1

AT#QSS=1 valid for SELINT=0,1,2
OK

#QSS: 0 unsolicited indication: the SIM is extracted.

#QSS: 1 unsolicited indication: the SIM is inserted.

Example 2

AT#QSS=2 valid only for SELINT=2
OK

AT+IPR=19200 select the Serial Port speed = DTE speed
OK

AT&W0 store the setting on profile 0
OK

AT&P0 at Power ON use profile 0
OK

Power OFF/ON the Module

#QSS:1 unsolicited indication: SIM inserted



AT+CPIN?
+CPIN: SIM PIN SIM is locked

OK
AT+CPIN=<PIN> enter PIN
OK

#QSS: 2 unsolicited indication: SIM is unlocked

The interval time between the two unsolicited indications #QSS: 2 and #QSS: 3 depends from the number of SMS stored on the module and the Phonebook dimension.

#QSS: 3 unsolicited indication: SMS and Phonebook accessible

2.4.7.5. SIM Detection Mode

Use the following AT command to manage the SIMIN Pin used to detect the SIM.

AT#SIMDET=<mode>
OK

Example

AT#SIMDET?
#SIMDET: 2,1

AT#QSS=1
#QSS: 0 SIM is extracted
 unsolicited indication: SIM is extracted

#QSS: 1 SIM is inserted
 unsolicited indication: SIM is inserted

AT#SIMDET=0 simulate SIM not inserted, but it is still physically inserted
OK

#QSS: 0 unsolicited indication: SIM is **NOT** physically extracted



Now the SIM is extracted and inserted, but no unsolicited indication appears on DTE

extract the SIM

AT#SIMDET=1 simulate SIM inserted, but it is still physically extracted
OK

#QSS: 1 unsolicited indication: SIM is physically extracted

Now the SIM is inserted and extracted, but no unsolicited indication appears on DTE

2.4.7.6. Generic SIM access

Use the following command to read/write SIM files. To interpret the command flow and decode the meaning of the strings showed by the following example refer to [13], [16].

AT+CSIM=1 Lock SIM interface

OK

AT+CSIM=14,A0A40000026F30 select EF 6F30

+CSIM: 4, "9F0F"

OK

AT+CSIM=10,A0C000000F get response

+CSIM: 34, "000000696F30040011F555010200009000"

OK

AT+CSIM=10,A0B0000069 read binary

+CSIM:

214, "32F23002F60182F45032F01032F80242F41902F81062F21002F21012F60372F22072

F09972F81202F46142F22062F02062F86022F60132F11092F31412F47042F01022F83082
F63032F4

01FF9000"

OK

AT+CSIM=0 Unlock SIM interface

OK



2.4.7.7. Preferred Operator List

Use the following AT command to manage the Preferred Operator List stored on SIM.

AT+CPOL=[<index>][,<format>[,<oper>]]

For parameter description, refer to [1].

Responses:

- +CPOL: (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Checking the supported parameters:

AT+CPOL=?
+CPOL: (1-20) , (2)
OK



NOTE:

The used SIM supports 20 positions. The supported format (2) is numeric.

Reading the entire list:

AT+CPOL?
+CPOL: 1, 2, "20801"
+CPOL: 2, 2, "20810"
+CPOL: 3, 2, "23205"
+CPOL: 4, 2, "22802"
+CPOL: 5, 2, "29341"
+CPOL: 6, 2, "26207"
+CPOL: 7, 2, "21403"



```
+CPOL: 8,2,"21910"  
+CPOL: 9,2,"21601"  
+CPOL: 10,2,"23410"  
+CPOL: 11,2,"20201"  
+CPOL: 12,2,"20408"  
+CPOL: 13,2,"26003"  
+CPOL: 14,2,"20610"  
+CPOL: 15,2,"23002"  
+CPOL: 16,2,"26803"  
+CPOL: 17,2,"27202"  
+CPOL: 18,2,"24001"  
+CPOL: 19,2,"23802"  
+CPOL: 20,2,"24201"
```

OK



NOTE:

The meaning of the string "XXXYY" is the following:

- XXX = Mobile Country Code
 - YY = Mobile Network Code
-

Trying to delete the first entry using a non-existent <format> value just to see the response when the Extended Error Result code is enabled:

AT+CPOL=1,3

+CME ERROR: operation not supported

Deleting the first entry using a right <format> value:

AT+CPOL=1,2

OK

Checking if the first entry is deleted:

AT+CPOL?

+CPOL: 2,2,"20810"

+CPOL: 3,2,"23205"



•
•
+CPOL: 19,2,"23802"
+CPOL: 20,2,"24201"
OK



NOTE:

The entry on first position is deleted.

Writing a new entry on first position:

AT+CPOL=1,2,20801
OK

Checking if the first entry is written on first position:

AT+CPOL?

+CPOL: 1,2,"20801"
+CPOL: 2,2,"20810"

•
•

+CPOL: 19,2,"23802"
+CPOL: 20,2,"24201"
OK



NOTE:

The new entry is written on first position.

2.4.8. Network checking

2.4.8.1. Query Network status

Issue the following command:

AT+CREG?

Responses:

- +CREG: X,Y (Refer to [1] for the details.)
- OK
- ERROR
- See table below:



Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples:

Checking if Telit Module is registered:

AT+CREG?

+CREG: 0,1
OK

The antenna is not connected to the Telit Module, repeating the previous AT command:

AT+CREG?

+CREG: 0,3
OK

Telit Module is registered. Collecting Local Area Code and Cell Id:

AT+CREG=2

OK

AT+CREG?

+CREG: 2,1,55FA,12EB
OK

A wrong parameter is entered just to see the result format when verbose extended error result is enabled:

AT+CREG=9

+CME ERROR: operation not supported

2.4.8.2. Network Operator Identification

Once the mobile has registered on some Network, it is possible to query the mobile for Network identifications codes and names with the following command:

AT+COPS=?

Responses:

- +COPS: (.....) (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]



Examples

Telit Module is registered. Collecting Networks Operators Identifications:

AT+COPS=?

```
+COPS: (2,"I WIND",,"22288"),(3,"vodafone
IT",,"22210"),(1,"SI.MOBIL",,"29340"),(0-4),(0,2)
OK
```

The antenna is not connected to the Telit Module. Verbose extended error result is enabled. Repeating the previous AT command:

AT+COPS=?

```
+CME ERROR: no network service
```

2.4.8.3. Received Signal Strength & Quality

Once the mobile has registered on a Network, it may be useful to know the received signal strength & quality to give the User an indication about the radio link reliability. Use the following AT command:

AT+CSQ

Responses:

- +CSQ: XX,YY (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

The antenna is not connected to the Telit Module or not network coverage at all.

AT+CSQ

```
+CSQ: 99,99
OK
```

The antenna is connected to the Telit Module. Repeating the previous AT command:

AT+CSQ

```
+CSQ: 17,0
OK
```



**NOTE:**

<rssi> = Received Signal Strength Ind. = 17, <ber> = Bit Error Rate = 0.

A wrong parameter is entered just to see the result format when verbose extended error result is enabled:

AT+CSQ?

```
+CME ERROR: operation not supported
```

NOTE:

When Received Signal Strength Indication is less than 6 the radio link quality is poor, the call could be cut off.

NOTE:

The quality is measured on the traffic channel, hence it is available only during a conversation, *in Idle the reported value must not be considered.*
In conversation the quality decreases with the increase of the <ber> number.

NOTE:

The <ber> value refers strictly to the GSM radio channel and is a very technical parameter; it can be used to monitor the voice call quality since the voice quality is inversely proportional to the <ber> number.

NOTE:

The reported signal quality only refers to the GSM radio channel link and not to the whole path from the caller to the receiver. It may happen that the quality on the GSM radio link is very good and hence the reported <ber> is 0 (good quality) but the quality of the remaining path to the other party is very bad and hence the final data connection quality is very poor. For this reason the signal quality indicator <ber> should not be taken into account to monitor data calls quality.

2.4.8.4. Network Status Checking

Once the **Telit Module** is registered on a Network, it could be useful to know the received signal strength and the Network on which the **Telit Module** is registered. This information can be gathered by means of the following standard AT commands: +CREG, +COPS and +CSQ. These commands are not fast in the response due to Network response time, especially the +COPS command; if the User objective is to keep the



Software Application as general as possible, he/she can use the standard AT commands above mentioned and described on the previous paragraphs.

Telit Modules provide the User with proprietary AT commands to gather all the information needed in a faster and simpler way. The proprietary AT commands are: **#MONI, #SERVINFO.**

Selecting the Serving Cell

Select the Serving Cell with the following set command:

AT#MONI=0

Responses:

- OK
- ERROR

Collecting the Serving Cell Information

Collect the Serving Cell Information with the following execution command:

AT#MONI

Response:

- #MONI: (Refer to [1] for the details.)
OK

Examples

The antenna is not connected to the Telit Module. Trying to collect Cells Information just to see the format response:

AT#MONI

ERROR
OK

The antenna is connected to the Telit Module. Collecting network information only about the serving cell.

1. Selecting Serving Cell:

AT#MONI=0

OK

2. Collecting information:

AT#MONI

#MONI: I WIND BSIC:70 RxQual:0 LAC:55FA Id:12EB ARFCN:979 PWR:-75dbm TA:0
OK





NOTE:

The module is registered on the network "I WIND", the signal strength is -75dBm. For more information, refer to [1].

The antenna is connected to the Telit Module. Collecting network information about the serving cell and neighboring cells.

1. Selecting all available cells:

AT#MONI=7

OK

2. Collecting information:

AT#MONI

#MONI:	CellBSIC	LAC	CellId	ARFCN	Power	C1	C2	TA	RxQual	PLMN
#MONI:	S 70	55FA	12EB	979	-75 dbm	29	29	0	0	I WIND
#MONI:	N1 75	55FA	1297	983	-86 dbm	18	18			
#MONI:	N2 70	55FA	12EA	985	-87 dbm	17	17			
#MONI:	N3 73	55FA	1D23	754	-100 dbm	2	16			
#MONI:	N4 72	55FA	12EC	977	-101 dbm	3	3			
#MONI:	N5 72	55FA	1D0D	751	-107 dbm	-5	-5			
#MONI:	N6 FF	FFFF	0000	1007	-107 dbm	-1	-1			

OK



NOTE:

The module is registered on the network "I WIND", the signal strength is -75dBm. For more information, refer to [1].

Collecting the Serving Cell Information

Collect the Serving Cell Information with the following execution command:

AT#SERVINFO

Response:

○ #SERVINFO: (Refer to [1] for the details.)
OK

Examples

The Telit Module is registered. Collecting network information only about the serving cell:



AT#SERVINFO

```
#SERVINFO: 979,-75,"I WIND","22288",70,55FA,00,1,, "II",01,6
OK
```



NOTE:

The module is registered on the network "I WIND", the signal strength is -75dBm. For more information, refer to [1].

NOTE:

This command should be used only to gather information about network name and signal strength. To check if mobile is registered or is looking for a suitable network to register on, use +CREG command. As a matter of fact, if the network signal is too weak and mobile loses the registration, until a new network is found the #MONI command reports the last measured valid values and not the real ones. The TA (timing advance parameter) is valid only during a call.

TIP:

Check network registration with +CREG command. When mobile is registered, query the mobile for network operator name and signal strength with #MONI command.

2.4.8.5. Enhanced Network Selection and AT&T functions

Use the following set command to enable/disable the Enhanced Network Selection and the AT&T functions. The **Telit module** features enabled or disabled by this command are conditioned by the SIM card type used, as pointed out by the following notes.

AT#ENS=[<mode>]

For parameter description, refer to [1].

Responses:

- OK
- ERROR

Examples

Scenario 1: module with any SIM card.

AT#ENS=0

OK



NOTE: After entering the command, power OFF/ON the module to make the selected operation active. The module follows the Standard European operation described by the 3GPP specification R98, (factory configuration).

Scenario 2: module with no AT&T SIM cards.

AT#ENS=1

OK

NOTE: After entering the command, power OFF/ON the module to make the selected operation active. The module follows the Standard European operation described by the 3GPP specification R98 or R4 (in accordance with the used product) and supports the following features:

- use of EONS features (refer to [9], § 15)
- use of the ENS features for Network selection (refer to [9], §13)
- support of special requirements for USSD strings (refer to [9], <CDR-GSM-255>
- special support of strings ATDxxxxxPyyyyy (refer to [9] <CDR-CON-3074>, <CDR-CON-3342>)
- AT#AUTOBND=1 as default, if previous value ≠ 2
- AT#BND supports only values 0 and 3
- support of AT command PACSP to display the PLMNModeBit (refer to [9])
- AT#STIA=2,10 as default
- use of the max telephone number written on SIM instead of a default value equal to 20
- tone on USSD reception (refer to [9])
- AT#PLMNMODE=1 as default
- different coding and encoding for MCC and MNC for SAT functions (refer to [9])
- special handling of store field into the MWI messages (refer to [9], §16)

Scenario 3: module with an AT&T SIM card.



NOTE:

The following setting is recommended for AT&T SIM card.

AT#ENS=1

OK

NOTE:

After entering the command, power OFF/ON the module to make the selected operation active. The module follows the Standard European operation described by the



3GPP specification R98 or R4 (in accordance with the used product) and supports the features indicated in scenario 2, plus the following:

- Use of the Acting Home PLMN feature (refer to [9], § 12)
- The module writes in the SIM card the Location Info. Using the AT&T coding

NOTE:

When AT#ENS=1, it is recommended to use the following setting:

AT#AUTOBND=2

AT#NITZ=7,X (X if the user wants the URC)

AT#SMSMODE=1

2.4.9. Network Survey

Network Survey AT Command family holds a large number of commands. Hereafter are showed two examples.

2.4.9.1. Network Survey

Use the following AT command to perform a quick survey though channels belonging to the current band.

AT#CSURV [=<s>,<e>]

For parameter description, refer to [1].

Examples

AT#BND?

#BND: 0

OK

AT#CSURV=4,8

Network survey started ...

arfcn: 7 bsic: 18 rxLev: -78 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21007
cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 7 13 27

arfcn: 4 bsic: 16 rxLev: -85 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21094
cellStatus: CELL_SUITABLE numArfcn: 2 arfcn: 4 1021

arfcn: 8 rxLev: -92

arfcn: 6 rxLev: -93

arfcn: 5 rxLev: -98



Network survey ended

OK

2.4.9.2. BCCH Network Survey

Use the following AT command to perform a quick survey though channels belonging to the current band. The survey stops as soon as <n> BCCH carriers are found

AT#CSURVB = [<n>]

For parameter description, refer to [1].

Examples

AT#CSURVB=2

Network survey started ...

arfcn: 104 bsic: 63 rxLev: -68 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 4737
cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 114 989 995

arfcn: 761 bsic: 57 rxLev: -72 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 7437
cellStatus: CELL_FORBIDDEN numArfcn: 4 arfcn: 776 785 794 803

Network survey ended

2.5. Establishing a Voice call ¹

Before setting up a Voice Call, it is recommended to check if the **Telit Module** is registered on a network (see § 2.4.7.4) and if the signal strength is enough to carry on the radio link.

2.5.1. Setting up a Voice Call

This section describes how to set up a voice call.

2.5.1.1. Setting the Module in Voice Mode

Use the following AT command to set up the module for a Voice Call:

AT+FCLASS=8

OK

¹ Audio connection is not supported by GT863-PY and GT864-PY





NOTE:

+FCLASS=8 command may be omitted if the ";" modifier is added at the end of the ATD command, after the number to be dialed, see §2.5.2.

2.5.1.2. Setting the Desired Audio Path Active

The present section is applicable to the **Telit Modules** supporting the connection of audio devices, refer to [2], [3].

Telit Modules have two different audio paths:

- internal microphone/ear (MT)
- external microphone/ear (HF)

Usually the internal path is used for a handset function, while the external is used for hands-free function. There are two ways to switch between these two paths: SOFTWARE and HARDWARE, see the following AT command examples:

AT#CAP=<n>
OK

For parameter description, refer to [1].

Examples

Using SOFTWARE way to select internal audio path (MT):

AT#CAP=2
OK

Using SOFTWARE way to select external audio path (HF):

AT#CAP=1
OK

Using HARDWARE way to select audio path:

AT#CAP=0
OK

Selecting the audio path by means of the pin AXE [3]:

- set the hardware pin AXE = HIGH to select internal audio path (MT).
- set the hardware pin AXE = LOW to select external audio path (HF).





TIP:

When HARDWARE control is not used AXE pin can be left unconnected.

TIP:

The audio paths can be switched also during a call in both ways.



2.5.1.3. Setting the Desired Volume on the Active Audio Path Speaker Output

Use the following AT command to set up the volume level:

AT+CLVL=<vol>

OK

For parameter description, refer to [1].



NOTE:

The volume setting refers to the ACTIVE path ear line and is stored each time. When changing audio path the volume setting will be reset to the previously stored value for that audio path.

2.5.1.4. Checking for Microphone Mute Setting

The microphone of the active path can be muted with **AT+CMUT=1** command; to be sure that it is not muted use the following read command:

AT+CMUT?

Response:

- +CMUT: X (Refer to [1] for the details.)
OK



NOTE:

The mute setting does not work the same way as the volume setting. The mute setting configuration is valid for both audio paths.



2.5.2. Dialing a Phone Number (Voice Call)

AT command used to dial up a phone number.

ATD <number>[;]

For parameter and response description, refer to [1].

Examples

Calling the national number 040-4X92XYX. The module is set in voice mode (AT+FCLASS=8 has been executed).

ATD 0404X92XYX
OK

Calling the national number 040-4X92XYX in international format +39-040-4X92XYX. The module is set in voice mode (AT+FCLASS=8 has been executed).

ATD +390404X92XYX
OK

Calling the national number 040-4X92XYX in international format +39-040-4X92XYX. The module is not set in voice mode (AT+FCLASS=8 has not been executed). In this case to perform the Voice Call the User must use the ";" character at the end of the command.

ATD +390404X92XYX;
OK

2.5.3. Closing the Voice Call

Use the following AT command to close the current Voice Call:

ATH
OK



TIP:

During the voice call the module is in command mode, so the escape sequence (+++) must not be issued before sending commands.

2.5.4. Codec Information

Use the following AT command to get codec information about a call.

```
AT#CODECINFO = <format>,<mode>  
OK
```

For parameter description, refer to [1].

Example

```
AT#CODECINFO=1,1           enable codec information  
OK
```

```
ATD<phone number>;  
#CODECINFO: "HAMR", "FR", "EFR", "HR", "FAMR", "HAMR"  
OK
```

```
NO CARRIER                remote hang up  
#CODECINFO: "None", "FR", "EFR", "HR", "FAMR", "HAMR"
```

2.5.5. Audio Codec

Use the following AT command to select a codec during a call.

```
AT#CODEC = <codec>  
OK
```

For parameter description, refer to [1].

Example

```
AT#CODEC?  
#CODEC: 0                   get the current codec setting  
OK
```

```
AT#CODECINFO=1,1           enable codec information  
OK
```

```
ATD<phone number>;         establish the call  
#CODECINFO: "HAMR", "FR", "EFR", "HR", "FAMR", "HAMR"  
OK
```

```
NO CARRIER                remote hang up
```



#CODECINFO: "None", "FR", "EFR", "HR", "FAMR", "HAMR"

```

AT#CODEC=1                select FR mode
OK
ATD<phone number>;       establish the call
#CODECINFO: "FR","FR"
OK

NO CARRIER                remote hang up
#CODECINFO: "None","FR"
  
```

2.6. Establishing a CSD Data Call

Before establishing a CSD Data Call (not GPRS), it is recommended to check if the **Telit module** is registered on a Network and if the signal is strong enough to support the radio link (see § 2.4.7.4).

2.6.1. Setting up Data Call Device

This section describes how to set up the data call device.

2.6.1.1. Setting the Device in Data Mode

Use the following AT command to set up the module for a Data Call:

```

AT+FCLASS=0
OK
  
```



TIP:

The +FCLASS setting is stored in memory, so there is no need to repeat this command if +FCLASS setting is not required to change.

2.6.1.2. Setting the Desired Modulation and Speed for the Connection

The Data Connection can be established using different speeds, bearer services, connection element. The connection mode can be selected with the following set command:

```

AT+CBST[=<speed>[ ,<name>[ ,<ce>]]]
OK
  
```



For parameter description, refer to [1].

Examples

Reading current values:

AT+CBST?
+CBST: 0,0,1
OK

Setting new speed:

AT+CBST=1,0,1
OK

Checking if new speed value is set:

AT+CBST?
+CBST: 1,0,1
OK



TIP:

It is recommended to use the Non Transparent connection to avoid the reception of characters not concerning the transmitted message.

2.6.2. Dialing a Phone Number (Data Call)

Use the following command to dial a phone number:

ATD <number>

For parameter and response description, refer to [1].

Examples

Calling the national number 040-4X92XYX. The module is set in data mode (AT+FCLASS=0 has been executed).

ATD 0404X92XYX
CONNECT 9600

Calling the national number 040-4X92XYX in international format +39-40-4X92XYX. The module is set in data mode (AT+FCLASS=0 has been executed).

ATD +39404X92XYX
CONNECT 9600





TIP:

The response to the ATD command is returned after the modem handshaking, this takes about 30 seconds, so allow this time before doing anything.

TIP:

When the module is doing the handshake to establish the connection, entering any character closes the handshake and aborts the call.



2.6.3. Closing the Data Call

This section describes how to close a data call.

2.6.3.1. Exiting the Data Mode and Entering the Command Mode

To exit the module Data Mode, do the following:

1. Enter the following Escape Sequence: +++
2. Wait for the escape sequence pause time (see S12 parameter, refer to [1]).
3. Wait for the response OK.



NOTE:

After the Escape Sequence and during the call the only command accepted by the module is the ATH. All the other commands are not supported during a call.

TIP:

In order to enter the Command Mode no characters must be sent between two consecutive "+" characters (escape sequence pause time S12) forming the Escape Sequence.

2.6.3.2. Hanging up the Data Call

Use the following AT command to close the current data connection:

```
ATH  
NO CARRIER
```



TIP:

During the data call the module is in data mode (on line), so the escape sequence (+++) must be issued before sending AT commands to the module.

2.7. Answering an Incoming Call²

When an Incoming Call is detected, the module reports an Unsolicited Code. For details, refer to [1].

To answer the call, use the following AT command:

ATA

For response details, refer to [1].



TIP:

The call is answered with the appropriate type (VOICE or DATA) regardless of the +FCLASS setting active. To distinguish between Data and Voice see the command response or the extended format incoming call indication.

2.7.1. GSM Single Numbering Scheme

Most operators use a primary phone number associated to the voice service and a secondary phone number for data and fax. If the operator employs a GSM Single Numbering Scheme, the voice and data number is the same. To select the bearer to be used when a mobile terminated Single Numbering Scheme call is established, use the following command.

AT+CSNS=<mode>

OK

Example 1

AT+CSNS=0 voice (factory default)

OK

RING

RING

ATA

voice channel is ON

² In GT863-PY and GT864-PY modules the audio hardware is not supported.



Example 2

AT+CSNS=2 data

OK

RING

RING

ATA

.....



2.8. Enabling TTY Function

The characters entered through the TTY device, connected to the **Telit module** (see fig. 2), are coded using the following two tones: 1400 Hz and 1800 Hz. These tones are not supported by the GSM speech coder, consequently they must be transformed to be compatible with the speech coder. This activity is performed by the CTM modem that in the **Telit module** solution is internal to the module itself. The internal CTM modem transforms the two unsupported tones into the following four tones: 400Hz, 600Hz, 800Hz, 1000Hz that can be managed by the speech coder. The TTY device can be connected to the **Telit module** using one of the two audio paths provided by the module itself. This feature enables the transmission of the TTY data and voice jointly on the existing speech channel of the module.

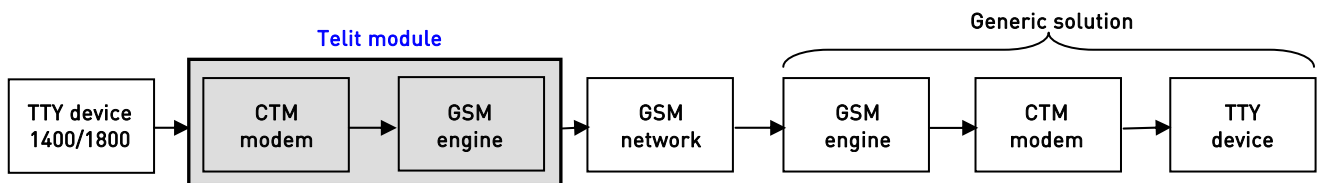


fig. 2: TTY device – module connection

Examples

Connect the TTY device (1400/1800) to the selected analog audio line of the module. In accordance with the selected physical audio connection, configure the audio path as indicated below.

Selecting the Hands Free audio path (“HF lines”, refer to § 2.5.1.2; Audio 2, refer to [6]):

1. Using SOFTWARE way to select external audio path (HF):

AT#CAP=1

OK

2. Setting the volume of the active audio path:

AT+CLVL=5

OK

3. Setting the Hands Free microphone input gain:

AT#HFMICG=4

OK

4. Disabling the side tone on Hands Free audio output:



AT#SHFSD=0

OK

5. Disabling echo canceller function on Hands Free audio output:

AT#SHFEC=0

OK

6. Disabling automatic gain control for Hands Free mode:

AT#SHFAGC=0

OK

7. Disabling noise reduction for Hands Free mode:

AT#SHFNR=0

OK

8. Enable the transmission of data on the existing speech channels:

AT#TTY=1

OK

After this configuration, the next Voice Call will be able to jointly support voice and TTY data.

Using the Hand Set audio path ("MT lines", refer to § 2.5.1.2; Audio 1, refer to [6]):

1. Using SOFTWARE way to select internal audio path (HS):

AT#CAP=2

OK

2. Setting the volume of the active audio path:

AT+CLVL=5

OK

3. Setting the Hand Set microphone input gain:

AT#HSMICG=4

OK

4. Disabling the side tone on Hand Set audio output:

AT#SHSSD=0

OK

5. Disabling echo canceller function on Hand Set audio output:

AT#SHSEC=0

OK

6. Disabling automatic gain control for Hand Set mode:

AT#SHSAGC=0

OK



7. Disabling noise reduction for Hand Set mode:

AT#SHSNR=0

OK

8. Enabling the transmission of data on the existing speech channels:

AT#TTY=1

OK

After this configuration, the next Voice Call will be able to jointly support voice and TTY data.



2.9. HW Flow control

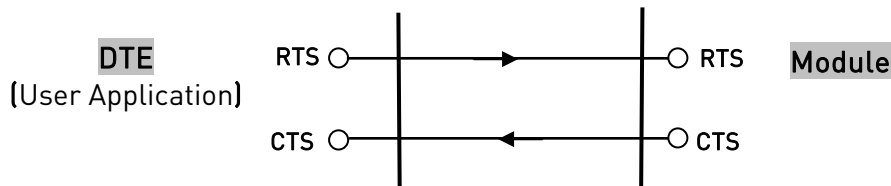


fig. 3: RTS/CTS flow control

2.9.1. RTS detection of DTE

RTS of DTE is checked by the module every GSM TDMA frame (4.61 ms). As soon as RTS of DTE is detected as NOT asserted the module immediately stops the transmitting of bytes toward DTE equipment.

Consequently, the maximum number of characters that Telit module can send to the DTE when RTS of DTE is NOT asserted depends on the used baud rate.

Example:

- at 115200 8N1 the maximum number of characters (bytes) is 54
115200 8N1 => 115200 bit/s = 11520 char/s = 11.52 char/ms = 53.1 char/frame
- at 57600 8N1 the maximum number of characters (bytes) is 27
- at 9600 8N1 is 5

2.9.2. CTS assertion of Module

CTS is asserted by the module when the data in its receiver buffer is greater than 75% (0x1000 bytes), the DTE transmission is stopped. CTS is NOT asserted when data in the receiver buffer of the module is lower than 25%, the DTE transmission starts again.



3. Advanced Operations

3.1. Accessing the Phonebook

The User can access the phonebook storage of the SIM card inserted on **Telit module**. By means of dedicated AT commands the User stores and recalls phone numbers and their associated names.

The **Telit module** supports the following SIM phonebook storages:

- "SM" - SIM phonebook
This is the PB used to store and recall numbers during the normal operation of the module.
- "FD" - SIM fixed dialing-phonebook (only phase 2/2+ SIM)
This PB has several restrictions; to set it you need the PIN2 code and after having activated the FD only the calls to the numbers stored in the FD or their children are allowed, all the other calls are forbidden.
- "LD" - SIM last-dialing-list (+CPBW and +CPBF are not applicable for this storage)
This is the list of the last dialed numbers, it is updated automatically at each call originated and insertion or search on it is not possible, the only operations allowed are recall, read and delete.
- "MC" - SIM missed-calls-list (+CPBW and +CPBF are not applicable for this storage)
This is the list of the missed calls calling numbers, it is updated automatically at each call missed and insertion or search on it is not possible, the only operations allowed are recall, read and delete.
- "RC" - SIM received-calls-list (+CPBW and +CPBF are not applicable for this storage)
This is the list of the received calls calling numbers, it is updated automatically at each call received and insertion or search on it is not possible, the only operations allowed are recall, read and delete.

In order to access the storage the User has to choose one. This must be the first Phone Book operation always. Once storage is selected, it is no longer needed to select it again until the desired storage remains the same and the module is turned off.

3.1.1. Selecting Phonebook Memory Storage

Use the following AT command to select the phonebook memory storage:

AT+CPBS=<storage>

For parameter description, refer to [1].



Responses:

- OK
- ERROR
- See the table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Reading the supported range of phonebook storages:

AT+CPBS=?

```
+CPBS: ("SM", "FD", "LD", "MC", "RC")  
OK
```

Reading the actual phonebook storage:

AT+CPBS?

```
+CPBS: "SM", 10, 250  
OK
```

Selecting "FD" phonebook storage:

AT+CPBS="FD"

```
ERROR
```

AT+CMEE=2

```
OK
```

AT+CPBS="FD"

```
+CME ERROR: SIM PIN2 required
```



NOTE:

When the FD storage is selected, the PIN2 must be inserted or the FD facility must be enabled. To enable the facility use +CLCK command (see par. 3.1.1.1)

NOTE:

If PIN2 is used, after 3 failed attempts the SIM is blocked. To unblock the SIM use PUK2, refer to § 2.4.7.

Selecting "MC" phonebook storage:

```
AT+CPBS="MC"
OK
```

```
AT+CPBS?
+CPBS: "MC", 0, 20
OK
```



NOTE:

After powering up and PIN authentication, the module reads the data records stored on the SIM for a backup. During this activity the SIM access is inhibited (SIM is busy after the issue of the PIN or after powering up if PIN request is disabled) for a time varying from few seconds to about one minute, depending on the percentage of written records in the SIM phonebook. If Phonebook commands are issued during this time interval the module returns an error message. If this happens, retry the operations later.

3.1.1.1. Locking or Unlocking ME

Use the following AT command to lock or unlock an ME³ or a Network facility:

```
AT+CLCK=<fac>, <mode>[ , <passwd>[ , <class>]]
```

For parameter description, refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Reading the supported facilities:

```
AT+CLCK=?
+CLCK: ("SC", "FD", "AO", "OI", "OX", "AI", "IR", "AB", "AG", "AC", "PN", "
PU", "PP", "PC", "PS", "PF")
OK
```

³ ME = module



Querying the status of the facility "SC":

```
AT+CLCK="SC",2
+CLCK: 1
OK
```

Querying the status of a wrong facility just to see the format response. Before doing that verify the Extended error result code.

```
AT+CMEE?
+CMEE: 2
OK
AT+CLCK="S1",2
+CME ERROR: operation not supported
```

3.1.2. Finding Phonebook Entries

Use the following AT command to find a phonebook entry.

```
AT+CPBF=<findtext>
```

For parameter description, refer to [1].

Responses:

- +CPBF: (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]



NOTE:

The search for <name> string is not case sensitive and the string may or may not be included in double brackets.

Examples

Reading the actual phonebook storage and selecting "SM" storage:

```
AT+CPBS?
+CPBS: "MC",0,20
OK
```



AT+CPBS="SM"

OK

AT+CPBS?

+CPBS: "SM",10,250

OK

Looking for entries having name starting with: "FA" on the selected storage:

AT+CPBF="FA"

+CPBF: 7,"+39404192369",145,"Fabio"

+CPBF: 9,"0404X92XYX",129,"Fabrizio"

OK

Looking for an entry not present on the selected storage. Before doing that verify if the Extended Error Result Code is enabled.

AT+CMEE?

+CMEE: 2

OK

AT+CPBF="FAUSTO"

+CME ERROR: not found

3.1.3. Reading Phonebook Entries

Use the following AT command to read a phonebook entry:

AT+CPBR=<index1>[,<index2>]

For parameter description, refer to [1].

Responses:

- +CPBR: (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Selecting "SM" storage:

AT+CPBS="SM"

OK



Looking for the entry at the position index = 7:

AT+CPBR=7

+CPBR: 7, "+39404192369", 145, "Fabio"
OK

Looking for the entries at the positions from 7 up to 9 and for example the position at index 8 is empty:

AT+CPBR=7,9

+CPBR: 7, "+39404192369", 145, "Fabio"
+CPBR: 9, "0404X92XYX", 129, "Fabrizio"
OK

3.1.4. Writing a Phonebook Entry

First, the User must select the desired storage as active, then use the following AT command to write a phonebook entry:

AT+CPBW=[<index>][, <number>[, <type>[, <text>]]]

For parameters description, refer to [1].

Responses:

- +CPBW: (Refer to [1] for details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Selecting the "SM" phonebook:

AT+CPBS="SM"

OK

Writing a new record on the "SM" phonebook:

AT+CPBW=, "0404192123", 129, "NewRecord"

OK

Checking where the new record has been written:



```
AT+CPBF="NEW"  
+CPBF: 8,"0404192123",129,"NewRecord"  
OK
```

3.1.5. Deleting a Phonebook Entry

First, the User must select the desired storage as active, and then use the following AT command to delete a phonebook entry:

```
AT+CPBW=<index>
```

For parameter description, refer to [1].

Responses:

- +CPBW: (Refer to [1] for details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Selecting the "SM" phonebook:

```
AT+CPBS="SM"  
OK
```

Deleting a record on the "SM" phonebook:

```
AT+CPBW= 7  
OK
```

Deleting a non-existent record on the "SM" phonebook, just to see the format response:

```
AT+CPBF=9999999999  
+CME ERROR: not found
```



TIP:

The delete operation simply overwrites the record number <index> with an empty record.



If the record to be deleted was already empty, no error messages will be shown, but it will be only filled again with empty values.

3.1.6. Dialing a Phonebook Entry

To dial a number previously stored in the phonebook, first the User must get the desired phone number index position using the +CPBF command. Once the <index> number is known, the User must set up the module for the needed type of call.

ATD> <n> [;]

For parameter description, refer to [1].

Wait for the response according to the call type issued.

Examples

Establishing a Voice call on the internal audio path MT to "Fabio" whose number is stored on the SIM phonebook:

1. Select the "SM" phone book as active storage.

AT+CPBS="SM"

OK

2. Find the index number where "Fabio" is recorded.

AT+CPBF="Fabio"

+CPBF: 7, "+390404X9YYYY", 145, "Fabio"

OK

NOTE: The first field is the index position: 7.

3. Set up Voice Call.

AT+FCLASS=8

OK

4. Use SOFTWARE way to select internal audio path (MT).

AT#CAP=2

OK

5. Set the volume.

AT+CLVL=8

OK

6. Check the mute setting.

AT+CMUT?

+CMUT: 0



7. Establish the voice call using the index, see the previous command:
AT+CPBF="Fabio".

```
ATD> 7  
OK
```

3.2. Encryption Algorithm

3.2.1. Set Encryption Algorithm

Use the following AT command to enables or disables the GSM and/or GPRS encryption algorithms supported by the module.

```
AT#ENCALG=[ <encGSM> ] [ , <encGPRS> ]  
OK
```

For parameter description, refer to [1].

Examples

```
AT#ENCALG=? get the supported range of value
```

```
#ENCALG: (0,1,4,5,255),(0-3,255)
```

```
OK
```

```
AT#ENCALG? get the current setting
```

```
#ENCALG: 5,3,1,0
```

```
OK
```

Selected: 5 = A5/1 or A5/3; 3 = GEA1 or GEA2

Last used: 1 = A5/1; 0 = no GPRS algorithm



```
AT#ENCALG=0,3          no GSM algorithm
OK
AT#ENCALG?             Setting is not changed
#ENCALG: 5,3,1,0
OK
turn OFF/ON the module
AT#ENCALG?             Setting is changed!
#ENCALG: 0,3,0,0
OK
```

3.3. Network Time Zone

3.3.1. Automatic Data/Time updating

Use the following AT command to enables or disables the data/time updating. Not all the Operators support this feature.

```
AT#NITZ=<val>,<mode>
```

Example

```
AT#NITZ?
#NITZ: 7,0
OK
```

```
AT#NITZ=154,1          enable full data/time updating
OK
AT&W0
OK
AT&P0
OK
```

⁴ Also enable the automatic Full Network Name updating if it is supported by the Network.



Power OFF/ON the module.

After GSM registration or GPRS attach, depending on the Network Provider configuration, on the DTE appears the following unsolicited indication.

#NITZ: 10/11/30,14:36:37+04,0 date/time and time zone + daylight saving time

Try the following commands just to make a comparison among the commands responses formats.

AT+CCLK?

+CCLK: "10/11/30, 14:36:42+04" date/time and time zone

OK

AT#CCLK? >

#CCLK: "10/11/30, 14:36:52+04,0" date/time and time zone + daylight saving time

OK

3.4. Call Management

3.4.1. Identifying the Call Type

The **Telit module** can identify the call type before answering. To accomplish this feature, the module provides different ring indications (Unsolicited Codes) depending on the call type. It is up to the User to enable the extended format reporting of incoming calls using the following AT command.

AT+CRC=[<mode>]

OK

For parameter description, refer to [1].

Examples

Disabling extended format reporting, then the module receives a call.

1. Check the range value.

AT+CRC=?

+CRC: (0,1)

OK



2. Disable extended format reporting.

AT+CRC?

+CRC: 0

OK

The module detects a call; ring indications are displayed on TE:

RING

RING

-
-
-

Enabling extended format reporting, and then the module receives a call.

1. Enable extended format reporting.

AT+CRC=1

OK

2. Check if extended format reporting is enabled.

AT+CRC?

+CRC: 1

OK

The module detects a call; ring indications in extended format are displayed on TE:

+CRING: VOICE

+CRING: VOICE

-
-
-

3.4.2. Identifying the Caller

The **Telit module** can identify the caller number and give indication about it before the call is answered. The Calling Line Indication is shown on TE after each RING or +CRING indication. The following AT command is used to enable/disable the Calling Line Indication.

AT+CLIP=[<n>]

OK

For parameter description, refer to [1].

Examples



Enabling extended format reporting and caller number identification, then receiving a call.

1. Enable extended format reporting.

```
AT+CRC=1  
OK
```

2. Check if extended format reporting is enabled.

```
AT+CRC?  
+CRC: 1  
OK
```

3. Check the values range.

```
AT+CLIP?  
+CLIP: 0,1  
OK
```

4. Enable caller number identification.

```
AT+CLIP=1  
OK
```

```
AT+CLIP?  
+CLIP: 1,1  
OK
```

NOTE: 1: CLI presentation enabled, 1: CLIP provisioned. Refer to [1].

The module detects a call, ring indications and Calling Line Identification of the calling party are displayed on TE:

```
+CRING: VOICE  
+CLIP: "+390404X92XYX",145,"",128,"",0  
+CRING: VOICE  
+CLIP: "+390404X92XYX",145,"",128,"",0
```

3.4.3. Restricting Calling Line Indication

The **Telit module** can send the Calling Line Indication (CLI) to the other party through the Network when an outgoing call is established. This indication can be restricted (CLIR) in various ways.

3.4.3.1. Querying CLIR Service Status

AT command used to query the CLIR Service status.



AT+CLIR?

+CLIR: <n>, <m> (Refer to [1] for the details.)

OK

Examples

Checking the current CLIR settings:

AT+CLIR?

+CLIR: 0, 4

OK

NOTE: 0: CLIR facility according to CLIR service network status, 4: CLI temporary mode presentation allowed. Refer to [1].



NOTE:

The <m> parameter reports the status of the service at network level.
If the CLIR service is not provisioned, then it is not possible to use this service and changing the first parameter <n> will not change the CLI presentation to the other party behavior of the network.

3.4.3.2. Restrict or Allow Caller Line ID Indication

Use the following AT command to enable or disable the presentation of the CLI to the called party.

AT+CLIR=<n>

OK

For parameter description, refer to [1].

Examples

Disabling the CLI presentation to the other party permanently.

1. Read the supported values.

AT+CLIR=?

+CLIR: (0-2)

OK

2. Read the actual module and network parameters.

AT+CLIR?

+CLIR: 0, 4

OK

3. Set to 1 module parameter, CLI not sent.



AT+CLIR=1

OK

4. Read the actual module and network parameters.

AT+CLIR?

+CLIR: 1,4

OK



3.4.4. Call Barring Control

The Call Barring service enables the User to control the calls. The User can block all outgoing calls, or all outgoing international calls, or all outgoing international calls except those for its Country, or all incoming calls, or all incoming calls while roaming. User can activate or cancel Call Barring using the right AT commands hereafter described. Moreover, the User needs to enter a special access code (Call Barring Access Code) to modify Call Barring options. The Call Barring Code is provided by Network Operator for every subscriber. Hereafter the Call Barring Code is indicated as "network password provided by Network Operator".

For the entire Call Barring service list and related AT commands refer to [1].



NOTE:

The Call Barring service is handled by the network, hence all the relative AT commands issue a network request and it may take several seconds to have the response from the network.

Furthermore, all the Call Barring service AT commands must be issued when the mobile is Registered on some Network, otherwise an error code is returned.

3.4.4.1. Querying Call Barring Service Status

Use the following AT command to interrogate the status of a selected network facility.

AT+CLCK=<fac>, 2

For parameter description, refer to [1].

Responses:

- +CLCK: (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]



Examples

Checking "IR" network facility status (Bar Incoming Calls status when Roaming outside the home country).

AT+CLCK=IR,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: "IR" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Checking "OI" network facility status (Bar Outgoing (originated) International Calls).

AT+CLCK=OI,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: "OI" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Checking the status of a non-existent network facility just to see the format response when Extended Error Result Codes is enabled in verbose format.

AT+CMEE=2

OK

AT+CLCK=IX,2

+CME ERROR: operation not supported

The module is not registered. Trying to check "OI" network facility status just to see the format response when Extended Error Result Codes is enabled in numeric format.

AT+CMEE=1

OK

AT+CLCK=OI,2

+CME ERROR: 100

NOTE: For +CME ERROR code refer to [1].

3.4.4.2. Barring or Unbarring All Incoming Calls

Use the following AT command to change the status of the AI network facility (All Incoming Calls):

AT+CLCK=AI,<mode>,<passwd>

For parameter description, refer to [1].



Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Locking and unlocking "AI" network facility. The network password provided by Network Operator is 2121.

Checking AI network facility status:

AT+CLCK=AI,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: "AI" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Locking "AI" network facility:

AT+CLCK=AI,1,2121

OK

Checking AI facilities status:

AT+CLCK=AI,2

+CLCK: 1,8

+CLCK: 1,4

+CLCK: 1,2

OK

NOTE: "AI" network facility is locked (1): 8 = short message service, 4 = fax, 2 = data.

Unlocking AI facilities:

AT+CLCK=AI,0,2121

OK

Checking AI facilities status:

AT+CLCK=AI,2

+CLCK: 0,1

+CLCK: 0,2



+CLCK: 0,4
OK

NOTE: "AI" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

3.4.4.3. Barring or Unbarring Incoming Calls in International Roaming

Use the following AT command to change the status of the "IR" network facility (Incoming Calls when Roaming outside the home country).

AT+CLCK=IR, <mode> , <passwd>

For parameter description, refer to [1].

Responses:

- OK
- E

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

R

- See table below:

Examples

Locking and unlocking "IR" network facility. The network password provided by Network Operator is 2121.

Checking "IR" network facilities status:

AT+CLCK=IR, 2

+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK

NOTE: "IR" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Locking "IR" network facility:

AT+CLCK=IR, 1, 2121

OK



Checking "IR" facilities status:

```
AT+CLCK=IR,2
+CLCK: 1,1
+CLCK: 1,8
+CLCK: 1,4
+CLCK: 1,2
OK
```

NOTE: "IR" network facility is locked (1): 8 = short message service, 4 = fax, 2 = data.

Unlocking "IR" network facility:

```
AT+CLCK=IR,0,2121
OK
```

Reading IR facilities status:

```
AT+CLCK=IR,2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK
```

NOTE: "IR" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

3.4.4.4. Barring or Unbarring All Outgoing Calls

Use the following AT command to change the status of the "AO" network facility (All Outgoing Calls).

```
AT+CLCK=AO,<mode>,<passwd>
```

For parameter description, refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Locking and unlocking "AO" network facility. The network password provided by Network Operator is 2121.



Checking "AO" network facility status:

```
AT+CLCK=AO,2  
+CLCK: 0,1  
+CLCK: 0,2  
+CLCK: 0,4  
OK
```

NOTE: "AO" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Locking "AO" network facility:

```
AT+CLCK=AO,1,2121  
OK
```

Checking "AO" network facility status:

```
AT+CLCK=AO,2  
+CLCK: 1,8  
+CLCK: 1,4  
+CLCK: 1,2  
OK
```

NOTE: "AO" network facility is locked (1): 8 = short message service, 4 = fax, 2 = data.

Unlocking "AO" network facility:

```
AT+CLCK=AO,0,2121  
OK
```

Checking "AO" network facility status:

```
AT+CLCK=AO,2  
+CLCK: 0,1  
+CLCK: 0,2  
+CLCK: 0,4  
OK
```

NOTE: "AO" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

3.4.4.5. Barring or Unbarring All Outgoing International Calls

Use the following AT command to change the status of the "OI" network facility (Outgoing International Calls).

```
AT+CLCK=OI,<mode>,<passwd>
```

For parameter description, refer to [1].

Responses:

- OK



+CLCK: 0,4
OK

NOTE: "OI" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

3.4.4.6. Barring or Unbarring All Outgoing International Calls except to Home Country

Use the following AT command to change the status of the "OX" network facility (Outgoing International Calls except to Home Country).

AT+CLCK=OX, <mode> , <passwd>

For parameter description refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Locking and unlocking "OX" network facility. The network password provided by Network Operator is 2121.

Checking "OX" network facility status:

AT+CLCK=OX, 2

+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK

NOTE: "OX" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Locking "OX" network facility:

AT+CLCK=OX, 1, 2121

ERROR

Enabling Extended Error Result Codes in verbose format:

AT+CMEE=2

OK



Trying again to lock "OX" network facility:

AT+CLCK=OX,1,2121

+CME ERROR: unknown

NOTE: Setting not supported by the network.

Checking "OX" network facility status:

AT+CLCK=OX,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: "OX" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.



3.4.4.7. Unbarring All Calls

Use the following AT command to unlock “AB” network facility (All Barring services).

AT+CLCK=AB,0,<passwd>

For parameter description, refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

Examples

Unlocking “AB” network facility. The network password provided by Network Operator is 2121.

AT+CLCK=AB,0,2121

OK

Checking “IR” network facility status:

AT+CLCK=IR,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: “IR” network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Checking “OI” network facility status:

AT+CLCK=OI,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

NOTE: “OI” network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

Checking “AI” network facility status:

AT+CLCK=AI,2

+CLCK: 0,1



```
+CLCK: 0,2
+CLCK: 0,4
OK
```

NOTE: "AI" network facility is unlocked (0): 1 = voice, 2 = data, 4 = fax.

3.5. Storing MSISDN into SIM

MSISDN is a number used to identify a mobile phone number internationally. MSISDN is defined by the Recommendation [12] which defines the numbering plan: a number uniquely identifies a public network termination point and typically consists of three fields, CC (country code), NDC (national destination code), and SN (subscriber number), up to 15 digits in total.

Use the following AT command to store the MSISDN on the assigned field (EF_MSISDN) of the SIM card. The User needs to follow the hereafter procedure which involves the structure knowledge of the field used by the SIM card to storage the MSISDN number.

AT+CRSM=<command>[,<file id>[,<P1>,<P2>,<P3>[,<data>]]]

For parameter details refer to [1].

Responses:

- +CRSM: (Refer to [1] for the details.)
OK
- ERROR

Examples

Getting the correct length of the field EF_MSISDN:

```
AT+CRSM=192,28480
+CRSM: 144,0,000000826F40040011F0FF0502011A
OK
```

NOTE: The field length is indicated, in HEX format, by the 15th byte of the returned string: 0x1A = 26.

Getting the EF_MSISDN field. It should be empty (FFFF..):

```
AT+CRSM=178,28480,1,4,26
+CRSM:
144,0,FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
OK
```

The structure of the EF_MSISDN field is the following (refer to [13] for the details):
<alpha id><length of BCD><TON and NPI><Dialing Number><Capability><Extension1>

- alpha id (12byte but can vary from SIM to SIM): FFFFFFFFFFFFFFFFFFFFFFFF



- length of BCD (1 byte): FF
- TON and NPI (1 byte): FF
- DIALING NUMBER (10 byte): FFFFFFFFFFFFFFFFFF
- Capability (1 byte): FF
- Extension1 (1 byte): FF

To store the MSISDN number into the EF_MSISDN field, start from the end of the string because the <alpha id> length can change and move towards the left:

1. Disregard the last 2 bytes, they remain as they are.
2. The next 10 bytes are reserved for the phone number:
 - National Format: 3491234567FFFFFFFF
 - International Format: 393491234567FFFFFFFF

Odd numbers have to be terminated with an "F", for example: 349123456F.

3. Swap the phone number digits as indicated below:
 - National Format: 3491234567FFFFFFFF ► 4319325476FFFFFFFF
 - International Format: 393491234567FFFFFFFF ► 934319325476FFFFFFFF
 - Odd numbers: 349123456FFFFFFFF ► 43193254F6FFFFFFFF
4. 1 byte (TON and NPI) can be 81 to indicate the National Format or 91 to indicate the International Format.
5. 1 byte (length of BCD) is the length of the MSISDN including the TON and NPI byte.

If the phone number is +39349123456, use the following AT command and string format to store it:

AT+CRSM=220,28480,1,4,26,FFFFFFFFFFFFFFFFFFFFFFFF07919343193254F6FFFFFFFF

+CRSM: 144,0

OK

Reading the just stored MSISDN phone number:

AT+CNUM

+CNUM: "", "+39349123456", 145

OK



AT#SNUM is an AT command more “user friendly”, but it is not supported by all products, see the following example:

AT#ENS=1 enable international phone number format

OK

write phone number and a memo string

AT#SNUM=1,"+393491234567","MY NUMBER"

OK

read

AT+CNUM

+CNUM: "MY NUMBER", "+393491234567", 145

OK



3.6. DTMF Tones

There are telephone systems which can be controlled by DTMF tones. To use these devices it is needed to have a phone that can send DTMF tones. When a key on the phone is pressed during a phone call this character is sent using DTMF. The following characters can be sent using DTMF: 0,1,2,3,4,5,6,7,8,9,A,B,C,D,* and #. The DTMF keypad is laid out in a 4x4 matrix, with each row representing a low frequency, and each column representing a high frequency (see Tab. 3). Pressing a single key such as '1' will send a sinusoidal tone of the two frequencies 697 Hz and 1209 Hz.

	1209Hz	1336Hz	1477Hz	1633Hz
697Hz	1	2	3	A
770Hz	4	5	6	B
852Hz	7	8	9	C
941Hz	*	0	#	D

Tab. 3: DTMF tones

Generally speaking, it is possible to send DTMF tones using fixed line phone or cell-phone. **Telit modules** provide the User with the following AT command to send DTMF tones during a phone connection.

AT+VTS=<dtmfstring>[,duration]

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

Checking the value range supported:

AT+VTS=?
(0-9,#,*,A-D) , (0-255)
OK

Checking the tone duration of the single character:

AT+VTD?
1
OK

Dialing the number in voice mode:



ATD0404192400;

OK

Sending the following sequence of the tones:

AT+VTS=123456789

OK

Cutting off the voice call:

ATH

OK

3.6.1. DTMF decoder

Use the following AT command to perform the decoding of the DTMF tones coming from the network.

AT#DTMF=1

Examples

Let's suppose to have two modules: the remote one sends DTMF tones, the local one decodes the received DTMF tones.

Local Module

AT#CPUMODE=1

OK

AT#DTMF=1

OK

AT#DTMF?

#DTMF: 1

OK

RING

RING

ATA

#DTMFEV: 1

#DTMFEV: 2

#DTMFEV: 3

Remote Module

.

.

.

.

.

.

.

ATD<module number>;

OK

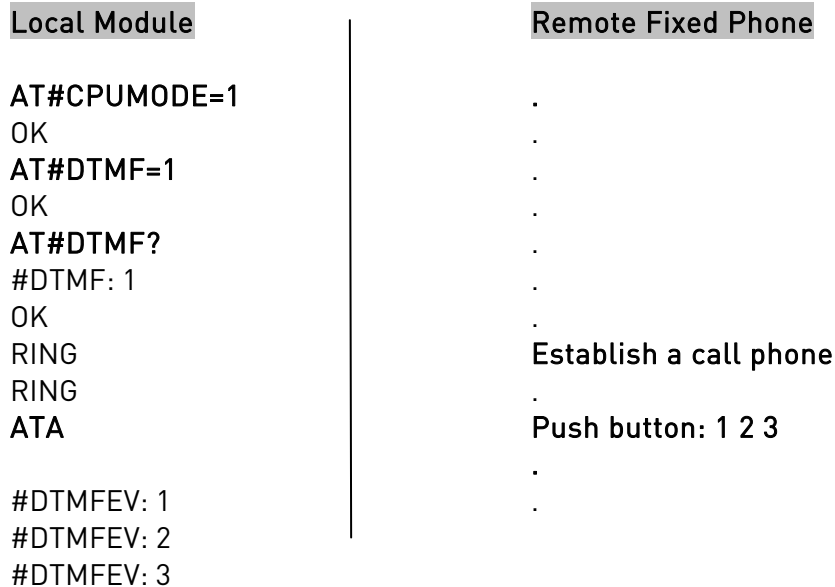
AT+VTS=123

OK

On the local module it is mandatory to enter the command **AT#CPUMODE=1**.
#DTMFEV: X unsolicited messages give info related to the received DTMF tones.



Let's suppose to have a local module and a remote fixed phone sending DTMF tones, the local module decodes the received DTMF tones.



On the local module it is mandatory to enter the command AT#CPUMODE=1. #DTMFEV: X unsolicited messages give info related to the pushed phone button (DTMF tones).



NOTE:

AT#DTMF command working in HR mode gives unpredictable results.



3.7. GSM Power Saving Function

The **Telit module** is provided with a function that reduces the power consumption during the period when it is in IDLE⁵ state, allowing a longer activity with a given battery capacity. Tab. 4 and Tab. 5 summarize the performances of the various +CFUN commands.

To introduce the matter, let's suppose to enter the command **AT+CFUN=5**. This command monitors the DTR line, see fig. 5, indicating if the User Application is ready to operate:

- when the DTR line is OFF (high, 3V on UART), the User Application is not ready to operate and the module can save energy by shutting down its serial port;
- when the User Application becomes ready to operate again the DTR line is ON (low, 0V on UART), the module detects this control line condition and powers up the serial port.

The DTR serial control line is used in CFUN=5 and in CFUN=7 mode, see fig. 5.

Another example: let's suppose to enter the command **AT+CFUN=0** or **AT+CFUN=9**. This command forces immediately the module in power saving mode, moreover it forces the module to monitor the RTS line indicating if the User Application is ready to send commands on the serial port. In this mode the module can detected also other events; see Tab. 4 and Tab. 5:

- RTS line ON (low, 0V on UART, default state) causes the module (DCE, see fig. 4) to assume the data channel transmit mode; the User Application is not going to send any AT commands. The module, accordingly with its transmitting needs, can save energy by shutting down its serial port;
- when the User Application needs to send data to the module the RTS line is OFF (high, 3V on UART). This condition causes the module (DCE) to assume the data channel non-transmit mode, powers up the serial port and enters CFUN=1 mode (Normal Operative Mode).

⁵ The module in IDLE state is waiting for a call.



NOTE:

The power saving function does not affect the network activity of the module: during the power saving mode the module remains registered on the network and reachable for incoming calls or SMS. If a call comes in during the power saving mode, the module will wake up and proceed normally with the unsolicited incoming call code.

TIP:

When the module is in sleep mode, the paging time is in the interval 0.5 ÷ 2.1 sec (It depends by DRX time set by network). When the module wakes up from the sleep mode, it takes a maximum of 150 ms before checking the DTR line coming from the User Application. So if a command is received during the sleep interval, the module needs at least $(0.5 \div 2.1)s + 150 \text{ ms}$ to be ready. Hence use a delay of at least 2250 ms between the port opening (DTR=ON) and command sending.

RTS=OFF and DTR=ON events both force the module to exit the power saving mode.

According to the V.24 standard: when the module is not ready to receive commands it will tie up the CTS line (refer to fig. 5), when it is ready to receive commands it will tie down the CTS line; hence the User Application can monitor the CTS line to check if the module is ready for commands.

3.7.1. Enabling and Disabling the Power Saving Function

Use the following AT command to enable or disable power saving function:

AT+CFUN=[<fun>[,<rst>]]

For parameter description refer to [1].

Responses:

- OK
- ERROR

Examples

Checking the supported values for <fun> and <rst>:

AT+CFUN=?
+CFUN: (0,1,2,4,5,7,9), (0)
OK

NOTE: fun: 0, 1, 2, 4, 5, 7, 9; rst: 0.

Checking the current setting of <fun>:



AT+CFUN?

+CFUN: 1

OK

NOTE: fun = 1, module with full functionality and Power Saving disabled (Factory default)



TIPS:

When the module is powered ON the power saving function is disabled (factory setting) in order to guarantee the AT command exchange with the module even if the DTR line is not supported; for this reason the power saving setting command should be issued after every power up.

The protocol implementation of the Module requires a delay between the consecutive activation of CFUN=1 and CFUN=4 (or vice versa) commands. It is suggested to use a delay of 10 sec.



3.7.2. Power saving modes

The following table describes the module functionality in the various CFUN modes. See also the following flow diagram and fig. 5.

Event	Module is in CFUN MODE when the event (first column) happens			
	<CFUN>=0	<CFUN>=2	<CFUN>=4	<CFUN>=5
RTS= OFF(high) → RTS=ON(low) ⁶	quit ⁷	no effect	no effect	no effect, RTS is only used for flow control
DTR=OFF(high) or DTR=ON(low)	no effect	no effect	no effect	DTR=OFF (high) module enters in power saving DTR=ON (low) module exits from power saving
Unsolicited Result Code	quit	no effect	no effect	temporary (only during event)
Incoming voice/data call	quit	not possible, GSM radio OFF	not possible, GSM radio OFF	temporary (only during event)
Any AT command	not possible, UART disabled	no effect	no effect	not possible, UART disabled, fig. 5
Incoming SMS(AT+CNMI is set to 0,0)	no effect	not possible, GSM radio OFF	not possible, GSM radio OFF	no effect
Incoming SMS(AT+CNMI is set to 1,1)	quit	not possible, GSM radio OFF	not possible, GSM radio OFF	temporary (only while sending SMS)
GPRS data transfer	no effect	not possible, GSM radio OFF	not possible, GSM radio OFF	temporary (only during event)
RTC alarm	quit	no effect	no effect	temporary (only during event)
AT+CFUN=1	not possible, UART disabled	quit ¹	quit ¹	not possible, UART disabled

Tab. 4: CFUN modes

⁶ The serial control lines levels are intended in CMOS levels

⁷ Quit = module goes back to normal mode CFUN=1



Event	<CFUN>=7 ⁸	<CFUN>=9 ⁹
RTS= OFF(high) → RTS=ON(low)	no effect, RTS is only used for flow control	quit ¹⁰
DTR=OFF(high) or DTR=ON(low)	no effect. System enters in power saving even if DTR=ON (low)	no effect
Unsolicited Result Code	temporary (only during event)	quit
Incoming voice/data call	temporary (only during event)	quit
Any AT command	UART is not disabled, fig. 5. CTS line is set when system enter in power saving, and it is reset when system exit from power saving. If Application uses HW flow control the incoming data are blocked when system is in power saving to avoid losing data	not possible, UART disabled
Incoming SMS(AT+CNMI is set to 0,0)	no effect	no effect
Incoming SMS(AT+CNMI is set to 1,1)	temporary (only while sending SMS)	quit
GPRS data transfer	temporary (only during event)	quit
RTC alarm	temporary (only during event)	quit
AT+CFUN=1	Possible, UART is not disabled	not possible, UART disabled

Tab. 5: CFUN modes

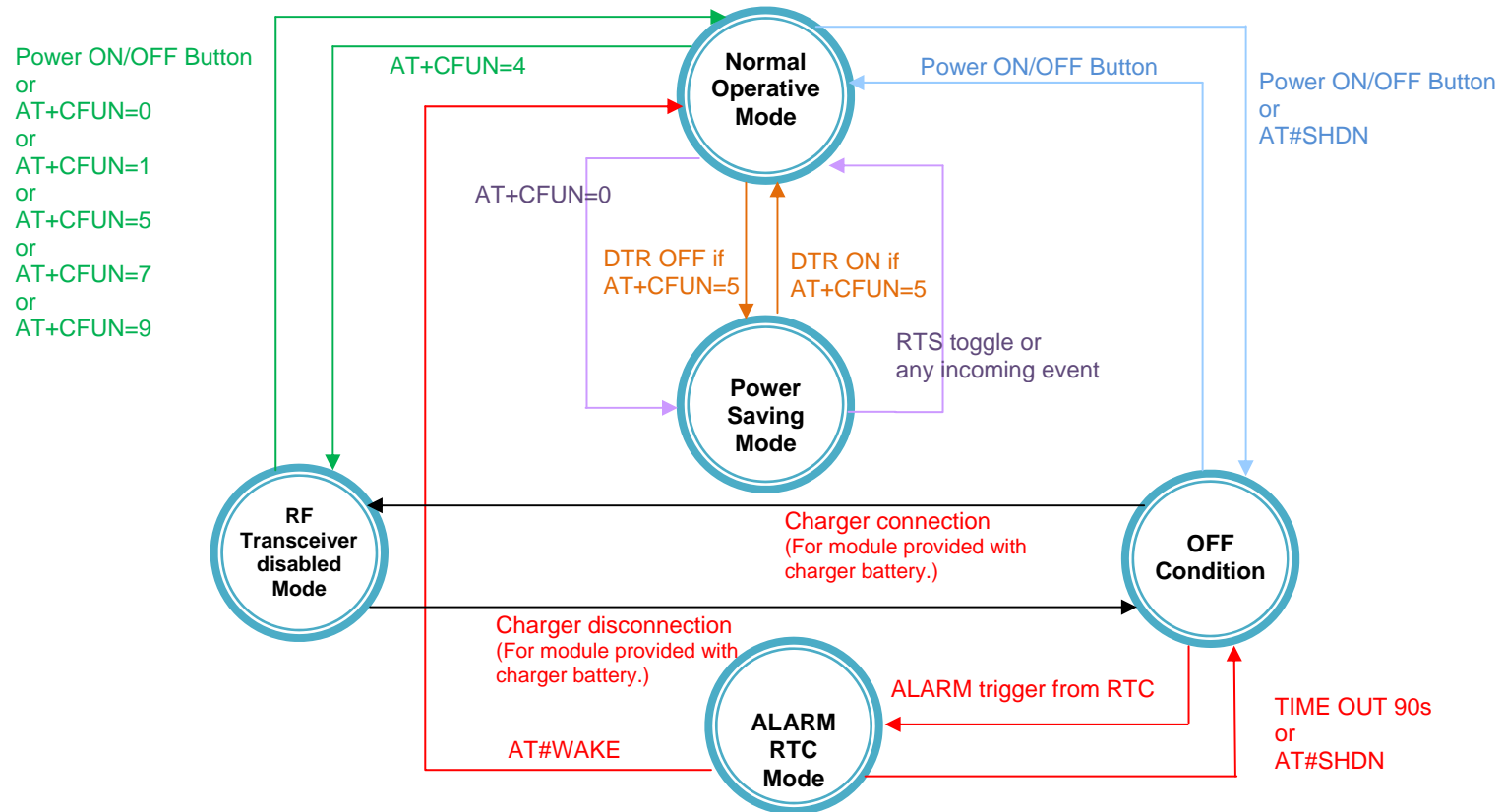
⁸ From SW version: 07.03.XX1 / 07.02.XX6 and 10.00.XX2

⁹ From SW version: 07.03.XX2 / 07.02.XX7 and 10.00.XX3

¹⁰ Quit = module goes back to normal mode CFUN=1



The following flow diagram describes the module functions in the various CFUN modes:



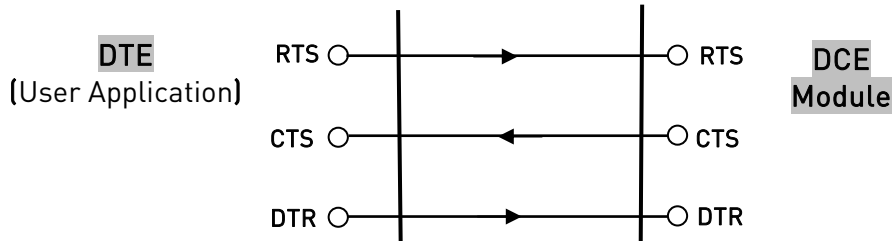


fig. 4: Control Serial lines

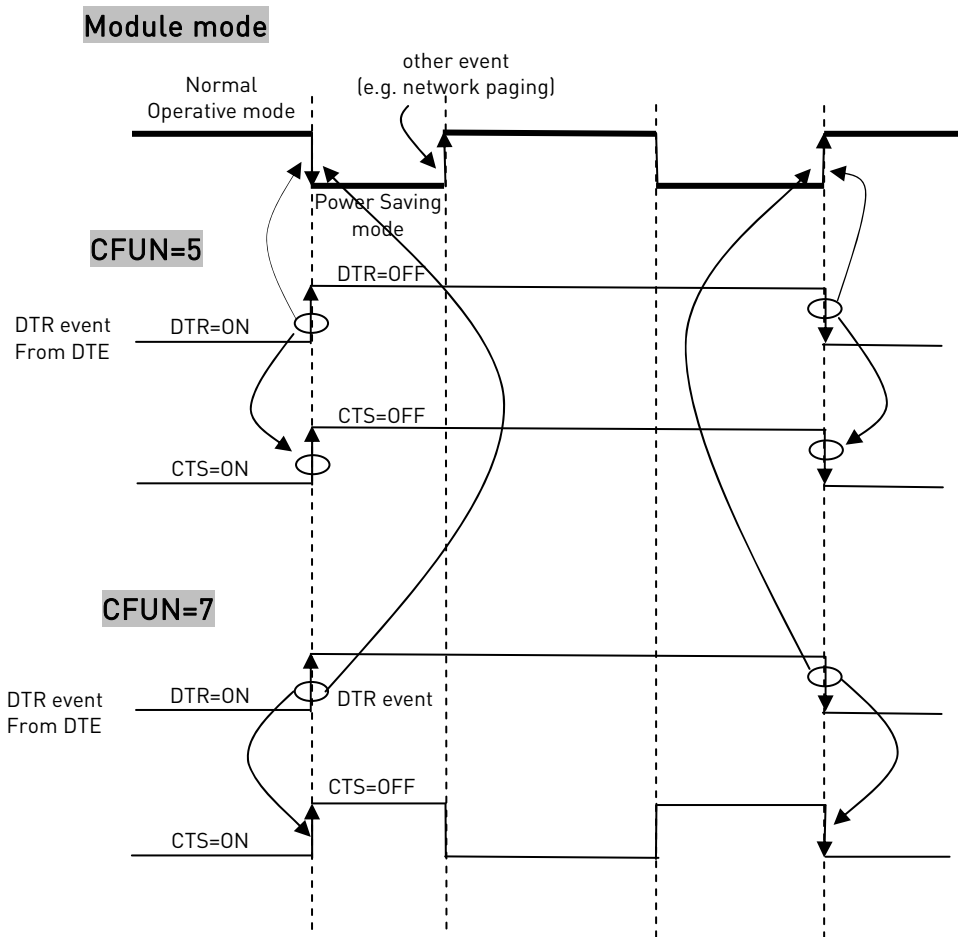


fig. 5: CFUN Mode vs. DTR event

3.8. SMS Management

The Telit modules support the Short Message Service to store, delete, write, send and receive an SMS, which is a short text message up to 160 characters long.

3.8.1. Setting up Short Message Service

Before using an SMS, the Short Message Service needs to be configured.

3.8.1.1. Selecting SMS format type

The Telit module supports two SMS formats:

- PDU mode
- Text mode

The PDU is the format used by the module to send a message on the air. The PDU mode enables the User to edit the message in that format. If the User is familiar with PDU encoding then he/she can operate with PDU by selecting that mode and use the appropriate commands. The present document uses the TEXT mode to explain how to operate with SMS. Follow the AT command used to select the mode.

AT+CMGF=<mode>

For parameter details refer to [1].

Responses:

- OK
- ERROR
- See table below:

Error result	
Format	Details
+CMS ERROR: XX	Refer to [1]



Examples

Checking the supported range of values:

AT+CMGF=?

+CMGF: (0,1)

OK

Setting up Text Mode for the SMS:

AT+CMGF=1

OK



TIP:

This setting is stored and remains active until the module is turned off.

Checking the actual Extended Error Result Code to evaluate the format error responses of the next commands.

AT+CMEE?

+CMEE: 2

OK

Selecting a wrong Mode just to see the format error response:

AT+CMGF=5

+CMS ERROR: 303

Enabling Extended Error Result Code in numerical format:

AT+CMEE=1

OK

Selecting again a wrong Mode just to see the format response:

AT+CMGF=5

+CMS ERROR: 303

Disabling Extended Error Result Code:

AT+CMEE=0

OK

Checking if Extended Error Result Code is disabled:

AT+CMEE?

+CMEE: 0

Selecting again a wrong Mode just to see the format response:



```
AT+CMGF=5  

+CMS ERROR: 303
```

3.8.1.2. Checking SMS Service Centre Number

An SMS is sent by the **Telit module** to a Service Centre (SMSC) where the message is dispatched towards its final destination or is kept until the delivery is possible. To ensure the correct operation of this service the number of the SMS Service Centre needs to be configured on the module in accordance with the Network Operator used. To know the SMSC number stored on the module, use the following AT command.

AT+CSCA?

Responses:

- +CSCA: (Refer to [1] for the details.)
OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)

Example

Checking the stored SMSC number:

```
AT+CSCA?  

+CSCA: "+393205858500",145  

OK
```

NOTE: SMSC number, international numbering scheme.

3.8.1.3. Adding SMS Service Centre Number

Use the following AT command only if required to store a new SMSC number. The old number is overwritten.

```
AT+CSCA=<number>,<type>
```

For parameter details refer to [1].

Responses:

- OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)



3.8.1.4. Selecting New Messages Indication Behavior

When the module receives a new SMS, an Unsolicited Indication is generated. This indication may be sent to the DTE, buffered if the DTE is busy (for example, during a data call), or discarded. To set the desired behavior, use the following command:

AT+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr>

For parameter details refer to [1].

Responses:

- OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)

Examples

To see an Unsolicited Indication on DTE send an SMS to the module itself. Follow the AT command sequence.

1. Select Text Mode.

AT+CMGF=1

OK

2. Disable improved SMS commands operation mode.

AT#SMSMODE=0

OK

3. Select memory storage to be used for SMS reading.

AT+CPMS="ME"

+CPMS: 1,1,13,50,13,50

OK

4. Select the behavior of the device on how the receiving of new messages from the network is indicated to the DTE.

AT+CNMI=1,1,0,0,0

OK

5. Send the message to the module itself.

AT+CMGS="+39329X569YYY"

> **SEND THE SMS #1 TO IT ITSELF** (close the message with Ctrl Z)

+CMGS: 76

OK



The SMS #1 is received by the module itself, the following unsolicited indication is shown on DTE:

```
+CMTI: "ME",1
```

6. Use unsolicited indication parameter to read for the first time the SMS #1.

```
AT+CMGR=1
```

```
+CMGR: "REC UNREAD","+39329X569YYY","WIND  
SIM","08/04/18,13:58:04+08"  
SEND THE SMS #1 TO MODULE ITSELF  
OK
```

7. Read again the SMS # 1 to see the "REC READ" indication.

```
AT+CMGR=1
```

```
+CMGR: "REC READ","+39329X569YYY","WIND  
SIM","08/04/18,13:58:04+08"  
SEND THE SMS #1 TO MODULE ITSELF  
OK
```

8. Issue the following command:

```
AT+CPMS?
```

```
+CPMS: "ME",1,1,"SM",13,50,"SM",13,50  
OK
```

9. Send the second message to the module itself:

```
AT+CMGS="+39329X569YYY"
```

```
> SEND THE SMS #2 TO THE MODULE ITSELF (close the message with Ctrl Z)
```

```
+CMGS: 77  
OK
```

The SMS #2 is received by the module itself, the following unsolicited indication is shown on DTE:

```
+CMTI: "ME",1
```

10. Use unsolicited indication parameter to read the just received SMS.

```
AT+CMGR=1
```

```
+CMGR: "REC UNREAD","+39329X569YYY","WIND  
SIM","08/04/18,14:47:23+08"  
SEND THE SMS #2 TO MODULE ITSELF  
OK
```

3.8.1.5. Setting Text Mode Parameters

When the module is set to operate in Text mode, the SMS parameters that usually reside on the header of the PDU must be set apart with the +CSMP command.



AT+CSMP=<fo>,<vp>,<pid>,<dc>

For parameter details refer to [1].

Responses:

- OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)

Examples

Setting the SMS parameters to the following values:

- <fo> first octet defines the following fields:

0	0	0	10	0	01
Module is not requesting a status report	Always 0	Replay Path not requested	Validity period field present in relative format	Always 0	SMS-SUBMIT

Binary number, 17 in decimal format.

- <vp> validity period (in relative format) = 24 hours is coded into 167 decimal format.
- <pid> protocol ID implicit (SMS sent to a module) corresponding to a value 0.
- <dc> data coding scheme, default value 0.

AT+CSMP= 17,167,0,0

OK

Setting the SMS parameters to the following values:

- <fo> first octet defines the following fields:

0	0	1	11	0	01
Module is not requesting a status	Always 0	Replay Path requested	Validity period field present	Always 0	SMS-SUBMIT



report			in absolute format		
--------	--	--	--------------------	--	--

Binary number, 57 in decimal format.

- <vp> validity period in absolute format represents the expiration date of the message, for example:
29/06/02 at 02:20 in the time zone of Italy (+1) is formatted as follows:
"29/06/02,02:20:00+1"
- <pid> protocol ID implicit (SMS sent to a module) corresponding to a value 0.
- <dcs> data coding scheme:
 - Default Alphabet
 - Class 0 (immediate display SMS)

Data coding scheme is coded in the following binary format 11110000, corresponding to 240 in decimal format.

```
AT+CSMP= 57, 29/06/02,02:20:00+1,0,240
OK
```



TIP:

The default value for dcs = 0 represents the default SMS sent by a module. If it is not needed any particular data coding scheme use dcs = 0.

NOTE:

Not all the dcs combinations described in the GSM 3.38 are supported jointly by the Network and by the Telit module. Some features may be not implemented on the Network or on the Telit module; this no matching is resulting in a +CMS ERROR: 303 (operation not supported) result code. If this happens use a different dcs.

3.8.1.6. Selecting SMS Memory and Checking for Memory Space

Telit Modules provide two types of SMS storage:

- "ME" - mobile equipment memory
- "SM" - SIM Card memory

An SMS (sent and received) is usually stored in the "SM" storage. The "ME" storage is a read only memory, where the received messages of Class 0 are stored regardless of



the selected storage which could be "SM". For this reason the "ME" storage needs to be selected to read the Class 0 messages.

The module provides the User with different types of storage: read-delete, write-send, and reception-saving SMS operations:

AT+CPMS=<memr> , <memw> , <mems>

For parameter details refer to [1].

Responses:

- +CPMS : (Refer to [1] for the details.)
- OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)



Examples

Checking the SMS commands operation mode:

```
AT#SMSMODE?
#SMSMODE: 0
OK
```

Checking the supported values for parameters <memr>,<memw>,<mems>:

```
AT+CPMS=?
+CPMS: ("ME","SM"), ("SM"), ("SM")
OK
```

```
AT+CPMS?
+CPMS: "SM",1,50,"SM",1,50,"SM",1,50
OK
```

```
AT+CPMS="ME"
+CPMS: 1,1,1,50,1,50
OK
```

```
AT+CPMS?
+CPMS: "ME",1,1,"SM",1,50,"SM",1,50
OK
```

Enabling improved SMS commands operation mode:

```
AT#SMSMODE=1
OK
```

Checking the supported values for parameters <memr>,<memw>,<mems>:

```
AT+CPMS=?
+CPMS: ("SM"), ("SM"), ("SM")
OK
```



3.8.2. Supported Character Sets

Use the following AT command to select the character set:

AT+CSCS=<chset>

For parameter details refer to [1].

Responses:

- +CSCS: (Refer to [1] for the details.)
OK
- ERROR
- See table below:

Error results if extended error result codes is enabled, see +CMEE command		
Numeric Format	or Verbose Format	Details
+CME ERROR: XX	understandable message	Refer to [1]

The supported character sets are the following:

- "GSM" (default alphabet, [7])
- "IRA" - ITU-T.50
- "8859-1" - ISO 8859 Latin 1
- "PCCP437" - PC character set Code Page 437.
- "UCS2" - 16-bit universal multiple-octet coded character set (ISO/IEC10646)

Examples

Checking the supported character sets:

AT+CSCS=?

+CSCS: ("GSM", "IRA", "8859-1", "PCCP437", "UCS2")
OK

Checking the current character set:

AT+CSCS?

+CSCS: "IRA"
OK

Selecting a non-existent character set, just to see the response format:

AT+CSCS="GSA"

ERROR



Enabling the error report in verbose format:

```
AT+CMEE=2  
OK
```

Selecting a non-existent character set, just to see the response format:

```
AT+CSCS="GSA"  
+CME ERROR: operation not supported
```

3.8.2.1. IRA Character Set

The IRA character set is used in Text mode. IRA set defines each character as a 7-bit value: from 0x00 to 0x7F. The table below reports all the supported characters and their hexadecimal code.

		Most Significant Nibble							
		0x	1x	2x	3x	4x	5x	6x	7x
Least Significant Nibble	x0			SP ¹	0	@	P		p
	x1			!	1	A	Q	a	q
	x2			"	2	B	R	b	r
	x3			#	3	C	S	c	s
	x4			\$	4	D	T	d	t
	x5			%	5	E	U	e	u
	x6			&	6	F	V	f	v
	x7			'	7	G	W	g	w
	x8			(8	H	X	h	x
	x9)	9	I	Y	i	y
	xA	LF ²		*	:	J	Z	j	z
	xB			+	;	K		k	
	xC			,	<	L		l	
	xD	CR ³		-	=	M		m	
	xE			.	>	N		n	
	xF			/	?	O	£	o	

¹ - SP stands for space character

² - LF stands for Line Feed character

³ - CR stands for Carriage Return character

The following examples show how to use the IRA table.



Examples

Using the table, get the IRA code of the character '&':

The most significant Nibble is 2, the least significant Nibble is 6, so the IRA code for the '&' character is the hexadecimal value: 0x26.

Using the table, translate IRA code 0x6B into the corresponding character:

The most significant Nibble is 6, the least significant Nibble is B, the cell at the crossing of column 6 and row B holds the character: "k".

3.8.2.2. UCS2 Character Set

The UCS2 Character Set is used in Text mode.

Examples

Send an SMS to the module itself and do not store it before sending. Use the "UCS2" character set.

1. Select Text Mode.

AT+CMGF=1

OK

2. Disable improved SMS commands operation mode.

AT#SMSMODE=0

OK

3. Select the UCS2 character set.

AT+CSCS="UCS2"

OK

4. Set SMS parameters:

AT+CSMP=17,168,0,26

OK

5. Select the module behavior on how the new received message from the Network is indicated to the DCE.

AT+CNMI=1,1,0,0,0

OK

6. Send the message to the module itself. The "UCS2" character set is used.

number phone: 329 05 69 628, convert it in "UCS2" format: 3=0033, 2=0032, 9=0039, 0=0030, 5=0035, 6=0036, 9=0039, 6=0036, 2=0032, 8=0038

text: CIAO, convert it in "UCS2" format: C=0043, I=0049, A=0041, O=004F



3.8.3. Writing a New SMS into Storage

A new SMS can be written in the selected storage <memw> (only "SM") and then can be sent to the desired destination. Use the following AT command to write a new SMS:

AT+CMGW="<da>"

For parameter details refer to [1].

Responses:

- +CMGW: (Refer to [1] for the details.)
OK
- ERROR
- +CME ERROR: XX (Refer to [1] for the details.)

Examples

Writing a new SMS in the storage and sending it to the module itself. Follow the AT command sequence.

1. Select Text Mode.

AT+CMGF=1

OK

2. Disable the improved SMS commands operation mode.

AT#SMSMODE=0

OK

3. Select memory type storage to be used for SMS reading.

AT+CPMS="ME"

+CPMS: 0,50,0,50,0,50

OK

4. Select the operation of the module on how the receiving of new messages from the network is indicated to the DTE.

AT+CNMI=1,1,0,0,0

OK

5. Store an SMS message to be sent to the module itself.

AT+CMGW="+39329X569YYY"

> **SEND THE STORED SMS #1 TO THE MODULE ITSELF** (close the message with Ctrl Z or ESC to abort)

+CMGW: 1

OK



6. Send the stored SMS #1.

```
AT+CMSS=1
+CMSS: 78
OK
```

The SMS #1 is received by the module itself, the following unsolicited indication is shown on DTE:

```
+CMTI: "ME",1
```

7. Check the current type storage memory for SMS reading.

```
AT+CPMS?
+CPMS: "SM",1,50,"SM",1,50,"SM",1,50
OK
```

8. Use index 1 to read SMS #1 from "SM" storage memory.

```
AT+CMGR=1
+CMGR: "STO SENT","+39329X569YYY","WIND SIM"
SEND THE STORED SMS # 1 TO MODULE ITSELF
OK
```

9. Select storage memory "ME".

```
AT+CPMS="ME"
+CPMS: 1,1,1,50,1,50
OK
```

10. Use index 1 to read received SMS #1 from "MR" storage memory.

```
AT+CMGR=1
+CMGR: "REC UNREAD","+39329X569YYY","WIND
SIM","08/04/21,09:56:38+08"
SEND THE STORED SMS # 1 TO THE MODULE ITSELF
OK
```

11. Use index 1 to read again received SMS #1 from "MR" storage memory.

```
AT+CMGR=1
+CMGR: "REC READ","+39329X569YYY","WIND
SIM","08/04/21,09:56:38+08"
SEND THE STORED SMS # 1 TO THE MODULE ITSELF
OK
```

Examine the following AT command sequence.

1. Set up PDU Mode.

```
AT+CMGF=0
OK
```

2. Store the SMS message to be sent to module itself.



AT+CMGW="+39329X569YYY"

+CMS ERROR: 304

NOTE: The command does not work when the device is in PDU Mode.

3. Set up Text Mode.

AT+CMGF=1

OK

4. Store the SMS message to be sent to module itself.

AT+CMGW="+39329X569YYY"

> **EDIT NEW SMS** . . .(ESC to abort the command.)

OK

NOTE: OK, the command is aborted.

3.8.4. Sending a Previously Stored SMS

An SMS written in the selected storage (only "SM") can be sent to the desired destination using the following AT command. To send the stored SMS, its storage location index is needed.

AT+CMSS=<index>

For parameter details refer to [1].

Responses:

- +CMSS: (Refer to [1] for the details.)
OK
- ERROR
- +CMS ERROR: XXX (Refer to [1] for the details.)

Examples

Sending a previously stored SMS to the module itself:

1. Select Text Mode.

AT+CMGF=1

OK

2. Select memory storage to be used for SMS reading.

AT+CPMS="SM"

+CPMS: 1, 50, 1, 50, 1, 50

OK



3. Read the previously stored SMS on "SM" storage memory.

AT+CMGR=1

```
+CMGR: "STO SENT", "+39329X569YYY", "WIND SIM"  
SEND THE STORED SMS # 1 TO MODULE ITSELF  
OK
```

4. Select the behavior of the module on how the receiving of the new messages from the network is indicated to the DTE.

AT+CNMI=1,1,0,0,0

OK

5. Send the stored SMS # 1 message to module itself.

AT+CMSS=1

```
+CMSS: 79  
OK
```

The SMS #1 is received by the module itself, the following Unsolicited Indication is shown on DTE:

```
+CMTI: "ME", 1
```

6. Edit a wrong storage index just to see the error result format.

AT+CMSS=2

```
+CMS ERROR: 321
```



3.8.5. Sending a New SMS without Storing It

A new SMS can be sent directly to the desired destination without storing it.

AT+CMGS="<da>"

For parameter details refer to [1].

Responses:

+CMGS: (Refer to [1] for the details.)

OK

ERROR

+CMS ERROR: XXX (Refer to [1] for the details.)

Examples

Sending an SMS message to the module itself and not storing it before transition.

1. Select Text Mode.

AT+CMGF=1

OK

2. Disable improved SMS commands operation mode.

AT#SMSMODE=0

OK

3. Select memory storage to be used for SMS reading.

AT+CPMS="ME"

+CPMS: 1,1,13,50,13,50

OK

4. Select the operation of the module on how the receiving of new messages from the network is indicated to the DTE.

AT+CNMI=1,1,0,0,0

OK

5. Send the message to the module itself.

AT+CMGS="+39329X569YYY"

> **SEND THE SMS #1 TO IT ITSELF** (close the message with Ctrl Z)

+CMGS: 76

OK

The SMS #1 is received by the module itself, the following unsolicited indication is showed on DTE:

+CMTI: "ME", 1



AT+CGATT?

+CGATT: 1

OK

4. Select Text Mode.

AT+CMGF=1

OK

5. Select the operation of the module on how the receiving of new messages from the network is indicated to the DTE.

AT+CNMI=1,1,0,0,0

OK

6. Send the message to the module itself.

AT+CMGS="+38641801924"

> **SEND THE SMS BY MEANS OF THE GPRS SERVICE TO ITSELF** (close the message with Ctrl Z)

+CMGS: 14

OK

The SMS is received by the module itself, the following unsolicited indication is showed on DTE:

+CMTI: "SM",11

- 7.

AT+CPMS="SM"

+CPMS: 11,50,11,50,11,50

OK

8. Use Unsolicited Indication parameter to read for the first time the SMS.

AT+CMGR=11

+CMGR: "REC UNREAD", "+38641801924", "", "09/08/03,14:14:04+08"
SEND THE SMS BY MEANS OF THE GPRS SERVICE TO ITSELF

OK



3.8.7. Deleting an SMS

Use the following AT command to delete an SMS stored on selected memory storage.

AT+CMGD=<index>

For parameter details refer to [1].

Responses:

- OK
- ERROR
- +CMS ERROR: (Refer to [1] for the details.)

Examples

Deleting an SMS stored in ME memory:

1. Select memory storage.

AT+CPMS="ME"

+CPMS: 1,1,13,50,13,50

OK

2. Check the SMS.

AT+CMGD=?

+CMGD: (1), (0-4)

OK

3. Delete SMS in memory position 1.

AT+CMGD=1

OK

4. Check if the SMS is deleted.

AT+CMGD=?

+CMGD: (), (0-4)

OK

Deleting an SMS stored in SM memory:

1. Select memory storage.

AT+CPMS="SM"

+CPMS: 13,50,13,50,13,50

OK

2. Check the SMS.



AT+CMGD=?

+CMGD: (1,2,3,4,5,6,7,8,9,10,11,12,13), (0-4)
OK

3. Delete SMS in memory position 1.

AT+CMGD=1

OK

4. Check if the SMS is deleted:

AT+CMGD=?

+CMGD: (2,3,4,5,6,7,8,9,10,11,12,13), (0-4)
OK

5. Delete all SMSs. Disregard the first parameter of the AT+CMGD.

AT+CMGD=1,4

OK

AT+CMGD=?

+CMGD: (), (0-4)
OK

6. Try to delete an SMS already deleted just to see the error result.

AT+CMEE?

+CMEE: 2
OK

AT+CMGD=1

+CMS ERROR: 321

7. Try to delete an SMS already deleted just to see the error result.

AT+CMEE=0

OK

AT+CMGD=1

+CMS ERROR: 321

8. Enter the AT command with wrong syntax just to see the error result.

AT+CMGD

ERROR



3.8.8. Reading an SMS

A new SMS is read with the following command:

AT+CMGR=<index>

For parameter details refer to [1].

Responses:

- +CMGR: (Refer to [1] for the details.)
OK
- ERROR
- +CMS ERROR: XXX (Refer to [1] for the details.)

Examples

Reading the selected SMS in the current memory storage:

AT+CPMS?

+CPMS: "SM",1,50,"SM",1,50,"SM",1,50
OK

Reading for the first time the SMS #1 in storage memory "SM", position 1:

AT+CMGR=1

+CMGR: "STO SENT","+39329X569YYY","WIND SIM"
SEND THE STORED SMS # 1 TO MODULE ITSELF
OK

3.8.9. Listing a Group of SMSs

SMSs can be grouped into 5 different groups depending on their status:

- REC UNREAD: received messages still not read
- REC READ: received messages already read
- STO UNSENT: written messages not yet sent
- STO SENT: written messages already sent
- ALL: all types of messages

Use the following AT command to query the SMS status:

AT+CMGL=<stat>



For parameter details refer to [1].

Responses:

- +CMGR: (Refer to [1] for the details.)
OK
- ERROR
- +CMS ERROR: XXX (Refer to [1] for the details.)

Examples

Follow this AT command sequence:

1. Check if Text Mode is active.

AT+CMGF?

+CMGF: 1

OK

NOTE: Text Mode is active

2. Check the supported SMS status.

AT+CMGL=?

+CMGL: ("REC UNREAD", "REC READ", "STO UNSENT", "STO SENT", "ALL")

OK

3. Select memory storage "ME".

AT+CPMS="ME"

+CPMS: 1,1,1,50,1,50

OK

4. List SMSs stored in the selected memory storage.

AT+CMGL="ALL"

+CMGL: 1, "REC READ", "+39329X569YYY", "WIND

SIM", "08/04/21,09:56:38+08"

SEND THE STORED SMS # 1 TO THE MODULE ITSELF

OK

AT+CMGL="REC UNREAD"

OK

AT+CMGL=4

+CMS ERROR: 302

5. Select memory storage "SM".

AT+CPMS="SM"

+CPMS: 1,50,1,50,1,50

OK

6. List SMSs stored in the selected memory storage.



AT+CMGL="ALL"

```
+CMGL: 1,"STO SENT","+39329X569YYY","WIND SIM",
SEND THE STORED SMS # 1 TO THE MODULE ITSELF
OK
```

AT+CMGL="REC READ"

OK

3.8.10. Cell Broadcast Service

GSM standard specifies two different types of SMS: SMS Point to Point (SMS/PP) and the SMS Cell Broadcast (SMS/CB). The first type can send a text message long up to 160 characters from a module to the another (as stated on the previous paragraphs), the second type allows the Network to send, at the same time, a message to all modules contained in the defined area including one or more radio cells. The availability and the implementation of the Cell Broadcast Service are strictly connected with the Network Operator of the subscriber.

Use the following AT command to enable the Cell Broadcast Service:

AT+CSCB=[<mode> [, <mids> [, <dcss>]]]

For parameter details refer to [1].

Responses:

- OK
- +CMS ERROR: XXX (Refer to [1] for the details.)

Examples

1. Select Text Mode.

AT+CMGF=1

OK

2. Select the District service, see note **Error! Bookmark not defined..**

AT+CSCB=0,50,0

OK

3. Select the operation of the module on how the receiving of new broadcast messages from the network is indicated to the DTE.

AT+CNMI=2,0,2,0,0

OK

After a while the "District" broadcast message is displayed on the DTE.

```
+CBM: 24,50,1,1,1
```

```
TRIESTE
```



+CBM: 4120, 50, 2, 1, 1
TRIESTE

+CBM: 8216, 50, 1, 1, 1
TRIESTE

+CBM: 12312, 50, 2, 1, 1
TRIESTE

The following list of Services can be provided by the Network Operator, it is not mandatory:

<mids>	Service name
000	Index
010	Flashes
020	Hospitals
022	Doctors
024	Pharmacy
030	Long Distant Road Reports
032	Local Road Reports
034	Taxis
040	Weather
050	District
052	Network Information
054	Operator Services
056	Directory Inquiries (national)
057	Directory Inquiries (international)
058	Customer Care (national)
059	Customer Care (international)

3.8.11. Read concatenated SMS

Use the following AT command to read concatenated SMS:

AT#CMGLCONCINDEX

Example

AT+CPMS?

check the number of SMS

+CPMS: "SM",7,30,"SM",7,30,"SM",7,30

7 SMS are stored

OK

AT#CMGLCONCINDEX

check the SMS concatenated presence

OK

no concatenated SMS are stored



Families & Products	GPIO < PIN > description								
	GPIO < pin > range	GPI Only Input pins	GPO Only Output pins	At startup the following GPIOs are configured as input. User settings are not saved and will be lost on Power Off. At start up repeat pins initialization commands.	At startup the user settings of the following GPIOs are maintained even after a Shutdown to permit "Alternate Functions" to be always properly set.	Alternate Functions			
						RF TX Contr. See 3.9.4.1	RF TX Mon. See 3.9.4.2	ALARM Output See 3.9.4.3	BUZZER Output See 3.9.4.4
GM Family (Modem)									
GM862-QUAD	1 - 13	1	2	3; 8 - 13	4,5,6,7	4	N/A	6	7
GM862-QUAD-PY	1 - 13	1	2	3; 8 - 13	4,5,6,7	4	N/A	6	7
GM862-GPS	1 - 13	1	2	3; 8 - 13	4,5,6,7	4	N/A	6	7
GC Family (Compact)									
GC864-QUAD	1 - 22	N/A	N/A	1 - 3; 8 - 22	4,5,6,7	4	5	6	7
GC864-PY	1 - 22	N/A	N/A	1 - 3; 8 - 22	4,5,6,7	4	5	6	7
GC864-DUAL	1 - 22	N/A	N/A	1 - 3; 8 - 22	4,5,6,7	4	5	6	7
GC864-QUAD-V2	1 - 10	N/A	N/A	1 - 3; 8 - 10	4,5,6,7	4	5	6	7
GC864-DUAL-V2	1 - 10	N/A	N/A	1 - 3; 8 - 10	4,5,6,7	4	5	6	7
GE Family (Embedded)									
GE863-QUAD	1 - 18	N/A	N/A	1 - 5; 8 - 18	4,5,6,7	4	5	6	7
GE863-GPS	1 - 18	N/A	N/A	1 - 5; 8 - 18	4,5,6,7	4	5	6	7
GE863-PY	1 - 18	N/A	N/A	1 - 5; 8 - 18	4,5,6,7	4	5	6	7
GE863-SIM	1 - 18	N/A	N/A	1 - 5; 8 - 18	4,5,6,7	4	5	6	7
GE863-PRO3	1 - 9	N/A	N/A	1 - 5; 8 - 9	4,5,6,7	4	5	6	7
GE863-PRO3 with Linux	1 - 9	N/A	N/A	1 - 5; 8 - 9	4,5,6,7	4	5	6	7
GE864-QUAD	1 - 22	N/A	N/A	1 - 3; 8 - 22	4,5,6,7	4	5	6	7



Families & Products	GPIO < PIN > description								
	GPIO < pin > range	GPI Only Input pins	GPO Only Output pins	At startup the following GPIOs are configured as input. User settings are not saved and will be lost on Power Off. At start up repeat pins initialization commands.	At startup the user settings of the following GPIOs are maintained even after a Shutdown to permit "Alternate Functions" to be always properly set.	Alternate Functions			
						RF TX Contr. See 3.9.4.1	RF TX Mon. See 3.9.4.2	ALARM Output See 3.9.4.3	BUZZER Output See 3.9.4.4
GE864-PY	1 - 22	N/A	N/A	1 - 3; 8 - 22	4,5,6,7	4	5	6	7
GE864-QUAD-Automotive	1 - 9	N/A	N/A	1 - 3; 8 - 9	4,5,6,7	4	5	6	7
GE864-QUAD-V2	1 - 9	N/A	N/A	1 - 3; 8 - 9	4,5,6,7	4	5	6	7
GE864-QUAD-Automomo. -V2	1 - 9	N/A	N/A	1 - 3; 8 - 9	4,5,6,7	4	5	6	7
GE864-QUAD-ATEX	1 - 10	N/A	N/A	1 - 3; 8 - 10	4,5,6,7	4	5	6	7
GE864-DUAL-V2	1 - 10	N/A	N/A	1 - 3; 8 - 10	4,5,6,7	4	5	6	7
GE865-QUAD	1 - 10	N/A	N/A	1 - 3; 8 - 10	4,5,6,7	4	5	6	7
GT Family (Terminal)									
GT863-PY	4 - 7	N/A	N/A	-	4,5,6,7	N/A	5	6	7
GT864-QUAD	4 - 7	N/A	N/A	-	4,5,6,7	N/A	5	6	7
GT864-PY	4 - 7	N/A	N/A	-	4,5,6,7	N/A	5	6	7

Tab. 6: GPIO pins description



3.9.1. Setting GPIO Pin as OUTPUT

Use the following AT command to set a GPIO as output with Low or High status value.

AT#GPIO=<pin>,<value>,1

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

Setting GPIO8 pin as Output with Low status:

AT#GPIO=8,0,1

OK

NOTE: GPIO8 pin was successfully put in output direction and its status has been set to Low.

Setting GPIO8 pin as Output with High status:

AT#GPIO=8,1,1

OK

NOTE: GPIO8 pin was successfully put in output direction and its status has been set to High.



NOTE:

In general the #GPIO setting is not saved and will be lost on Power Off. At start-up, repeat pin setting commands. For more details, in accordance with used module, refer to [3].



3.9.2. Setting GPIO Pin as INPUT

Use the following AT command to set a GPIO as input. A dummy value must be specified for pin status value.

AT#GPIO=<pin>,<dummy_value>,0

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

Setting GPIO9 pin as Input:

```
AT#GPIO=9,0,0  
OK
```

NOTE: GPIO9 pin was successfully put in Input direction.



NOTE:

In general the #GPIO setting is not saved and will be lost on Power Off. At start-up, repeat pin setting commands. For more details, in accordance with used module, refer to [3].

3.9.3. Querying GPIO Pin Status

AT command used to query the pin status:

AT#GPIO=<pin>,2

For parameter details refer to [1].

Responses:

- #GPIO: (Refer to [1] for the details.)
OK
- ERROR
- +CMS ERROR: XX (Refer to [1] for the details.)

Examples

Examine the following AT command sequence.

1. Set GPIO8 pin as Output with Low status.

AT#GPIO=8,0,1

OK

2. Set GPIO9 pin as Input.

AT#GPIO=9,0,0

OK

3. To continue the example, physically connect GPIO8 with GPIO9.
4. Check the GPIO9 status.

AT#GPIO=9,2

#GPIO: 0,0

NOTE: GPIO9 pin is set in Input direction and its status is Low, as commanded by GPIO8.

5. Set GPIO8 pin as Output with High status.

AT#GPIO=8,1,1

OK

6. Check the GPIO9 status.

AT#GPIO=9,2

#GPIO: 0,1

NOTE: GPIO9 pin is set in Input direction and its status is High, as commanded by GPIO8.

7. Check the GPIO8 status.

AT#GPIO=8,2

#GPIO: 1,1



NOTE: GPIO8 pin is set in Output direction and its status is High.



NOTE:

If GPIO pin direction is set to Alternate Function mode, the reported status has no valid meaning.

Checking the supported range of pin, mode and direction. (Used for GM862-QUAD module.)

AT#GPIO=?

#GPIO: (1-13), (0-2), (0-2)

OK

NOTE: <pin> = [1-13], <mode> = [0-2], <dir> = [0-2].



TIP:

The query report is function of the pin direction:

- input: the query report indicates the current input status;
- output: the query report indicates the previously set pin status.

In any case, the User can know at the moment query if the pin is high or low and the pin direction.



3.9.4. GPIO Used for Alternate Function

For a detailed documentation about the Alternate Functions and GPIO circuitry aspects refer to [3]. The following paragraphs of the current section describe the GPIO dedicated to support the “Alternate Function” configuration and the AT commands used to perform the setting.

3.9.4.1. GPIO4 Pin as RF Transmission Control

The GPIO4 pin is provided with circuitry to manage the “RF Transmission Control”. The User Application by means of the GPIO4 can control the transmitter of the module. Use the following AT command to set the GPIO4 in “RF Transmission Control” Alternate Function.

AT#GPIO=4,<dummy_value>,2

For parameter details refer to [1].

Responses:

- OK
- ERROR



TIP:

The Alternate Function sets the GPIO4 pin in INPUT direction.

NOTE:

The GPIO4 pin direction, in “Alternate Function” setting, is saved also after module power off. In accordance with the Telit module in use, refer to [3] for details on circuitry pin issues.

3.9.4.2. GPIO5 Pin as RFTXMON OUTPUT

The GPIO5 pin is provided with circuitry to be connected to the “RFTXMON OUTPUT”. The User Application by means of the GPIO5 can monitor the transmitter module status. Use the following AT command to set the GPIO5 in “RFTXMON OUTPUT” Alternate Function.

AT#GPIO=5,<dummy_value>,2

For parameter details refer to [1].



Responses:

- OK
- ERROR

Example

Setting GPIO5 pin as RFTXMON OUTPUT:

AT#GPIO=5,0,2

OK

NOTE: GPIO5 pin is successfully set in RFTXMON OUTPUT Alternate Function.



TIP:

The Alternate Function sets the GPIO5 pin in OUTPUT direction.

NOTE:

The GPIO5 pin direction, in “Alternate Function” setting, is also saved after module power off.

3.9.4.3.

GPIO6 Pin as ALARM OUTPUT

The GPIO6 pin is provided with circuitry to be used as “ALARM OUTPUT”. The pin reports the ALARM state following the ALARM settings previously performed by means of the +CALA command. The User Application by means of the GPIO6 can monitor the ALARM status. Use the following AT command to set the GPIO6 pin in “ALARM OUTPUT” Alternate Function.

AT#GPIO=6,<dummy_value>,2

For parameter details refer to [1].

Responses:

- OK
- ERROR

Example

Setting GPIO6 pin as ALARM OUTPUT:

AT#GPIO=6,0,2

OK

NOTE: GPIO6 pin is successfully set in ALARM OUTPUT Alternate Function.





TIP:

Alternate Function sets the GPIO6 pin in OUTPUT direction. Because the GPIO6 pin value is controlled by the module software, use +CALA AT command to setup a needed ALARM setting.

NOTE:

The GPIO6 direction, in "Alternate Function" setting, is also saved after module power off.



3.9.4.4. GPIO7 Pin as BUZZER OUTPUT

The GPIO7 pin is provided with circuitry to be used as “BUZZER OUTPUT”. Use #SRP AT command to set up a needed BUZZER setting and the following AT command to set the GPIO7 pin in “BUZZER OUTPUT” Alternate Function.

AT#GPIO=7,<dummy_value>,2

For parameter details refer to [1].

Responses:

- OK
- ERROR

Example

Setting GPIO7 pin as BUZZER OUTPUT:

AT#GPIO=7,0,2

OK

NOTE: GPIO7 pin is successfully set in BUZZER OUTPUT Alternate Function.



TIP:

Alternate Function sets the GPIO7 pin in OUTPUT direction. GPIO7 pin value is controlled by the module software, use #SRP AT command to setup a needed BUZZER setting.

NOTE:

The GPIO7 direction, in “Alternate Function” setting, is also saved after module power off.



3.9.5. Clock and Alarm Functions

Telit Modules are provided with Real Time Clock and Alarm features which implement the following functions:

- Setting up the right time
- Checking the actual time
- Setting up an alarm time

Use +CALA AT command to perform the alarm setting. To avoid losing the time setting there must not be any interruption of the power supply of the **Telit Module**. In general, update the **Telit Module** clock before using the Alarm feature.

On alarm trigger the **Telit Module** can do the following:

- Automatically Wake-up fully operative from shutdown
- Automatically Wake-up in the dedicated "Alarm Status" from shutdown. The module does not look for or try to register on any network, it performs only the previously programmed "alarm actions" and it can receive AT commands to become fully operative or shut down immediately.
- If already ON at alarm trigger time, it simply performs the "alarm actions"

Once woken up, the **Telit Module** performs the chosen action that can be the following:

- Issue an Unsolicited Code "+CALA: <user_text>" on the serial port until a 90s timeout expires or a special Wake-up command is received.
- Play an Alarm tone until a 90s timeout expires or a special Wake-up command is received.
- Rise the pin GPIO6 until a 90s timeout expires or a special Wake-up command is received.
- Any combination of the above actions.

Example actions the **Telit Module** can perform using these features:

- Wake up itself and its controlling hardware, by means of the GPIO6 pin, at the desired time: a timely survey can be programmed without the need to power on any hardware; the objective to minimize power consumption is reached.
- Activate some User devices on a time trigger event by means of the GPIO6 pin.
- Alert the User Application that the "alarm time" is expired by means of the previously programmed Unsolicited Code "+CALA:<user_text>".
- Alert the User playing the alarm tone.



3.9.5.1. Regulating the Clock

Use the following AT command to update the module clock.

AT+CCLK=<time>

For parameter details refer to [1].

Responses:

- OK
- ERROR



NOTE:

If the parameter is omitted, the behavior of Set command is the same as Read command.

Example

Setting up the clock to 7 November 2002 at 12h 24m 30s for the time zone +01h central Europe:

AT+CCLK="02/11/07,12:24:30+04"

OK

NOTE: The time is successfully set.



TIP:

The string time has to be encapsulated in double brackets.

NOTE:

The updated time start immediately after the time setting command.

3.9.5.2. Reading the Current Date and Time

Use the following AT command to display the module clock.

AT+CCLK?

+CCLK: (Refer to [1] for the details.)

OK

Examples



Reading the current time:

```
AT+CCLK?
+CCLK="02/11/07,12:26:47"
OK
```

NOTE: current date/time is: 7 November 2002 12h 26m 47s

Entering the current time: year/month/day,hour:minute:seconds±time zone:

```
AT+CCLK="08/05/16,09:20:30+00"
OK
```

Reading the time:

```
AT+CCLK?
+CCLK: "08/05/16,09:20:52"
OK
```



NOTE:

The three last characters of <time> are not returned by +CCLK? because the module does not support time zone information, refer to [1].

3.9.5.3. Regulating the Alarm Time and Operations

Use the following AT command to set up the Alarm configuration:

```
AT+CALA="<time>",<0>,<type>,<text>"
```

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

Follow this command sequence to set up an Alarm configuration.

1. Read the current time.

```
AT+CCLK?
+CCLK: "08/05/16,09:20:52"
OK
```

2. Set up an Alarm configuration.

```
AT+CALA="08/05/16,09:35:30+00",0,2,"ALARM, ALARM, ALARM"
OK
```



3. Read the current time.

AT+CCLK?

+CCLK: "08/05/16,09:33:15"

OK

4. Read the current time.

AT+CCLK?

+CCLK: "08/05/16,09:34:04"

OK

5. Read the current time, on the next step the Alarm time is reached.

AT+CCLK?

+CCLK: "08/05/16,09:34:49"

OK

The Alarm time is reached, the module displays on the DCE the previously configured Unsolicited Code:

+CALA: ALARM, ALARM, ALARM

+CALA: ALARM, ALARM, ALARM

+CALA: ALARM, ALARM, ALARM

+CALA: ALARM, ALARM, ALARM

+CALA: ALARM, ALARM, ALARM

.

.

.

.

Follow this command sequence to set up and delete Alarm configuration.

1. Read the current time.

AT+CCLK?

+CCLK: "08/07/18,10:17:21"

OK

2. set up an Alarm configuration

AT+CALA="08/07/18,10:22:00+00",0,2,"NEW ALARM"

OK

3. read the current time

AT+CCLK?

+CCLK: "08/07/18,10:19:04"

OK

4. read the current time



NOTE: the Alarm time is not reached

- delete the Alarm configuration

```
AT+CALA=""
OK
```

- read the current time

```
AT+CCLK?
+CCLK: "08/07/18,10:47:02"
OK
```

NOTE: the Alarm time is not reached

- read the current time

```
AT+CCLK?
+CCLK: "08/07/18,10:48:46"
OK
```

NOTE: the Alarm time is over, the unsolicited +CALA: NEW1 ALARM message is not appeared on the DCE in accordance with AT+CALA="" command.

Follow this command sequence to set up a recurrent Alarm configuration.

- read the current time

```
AT+CCLK?
+CCLK: "08/07/18,10:42:31"
OK
```

- set up a recurrent Alarm configuration for all days in the week

```
AT+CALA="11:45:00+00",0,2,"NEW2 ALARM",0
OK
```

- read the current time

```
AT+CCLK?
+CCLK: "08/07/18,11:35:25"
```



OK

NOTE: the response shows that the Alarm time is not reached.

The Alarm time is reached, the module displays on the DCE the previously configured Unsolicited Code:

```
+CALA: NEW2 ALARM  
+CALA: NEW2 ALARM  
+CALA: NEW2 ALARM  
+CALA: NEW2 ALARM  
+CALA: NEW2 ALARM
```

```
.  
.
```

4. exit "Alarm Activity" and enter "Normal Operating Mode"

```
AT#WAKE=0  
OK
```

5. set up the new day to simulate the passing of time

```
AT+CCLK="08/07/19,11:42:00+00  
OK
```

6. read the current time

```
AT+CCLK?  
+CCLK: "08/07/19,11:44:25"  
OK
```





NOTE:

If the Unsolicited Codes +CALA: <text> is used, then the serial port speed rate must be configured as needed (see § 2.4.5) and stored in the active profile (see &W AT command, refer to [1]), in order to perform the Telit module boot with the desired port speed, otherwise at the Alarm wakeup, the module will start with the default port speed rate that may differ from the speed rate set on DCE.

3.9.5.4. Postpone the Alarm Time and Operations

Use the following AT command to postpone the Alarm configuration. Now it is available only on GE865-QUAD module:

AT+CAPD=<time>

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

1. Read the current time

```
AT+CCLK?
+CCLK: "09/08/05,09:24:46+04"
OK
```

2. Set up an Alarm configuration

```
AT+CALA="09/08/05,09:28:00+04",0,2,"NEW ALARM"
OK
```

3. Postpone of 60 seconds the just configured Alarm

```
AT+CAPD=60
OK
```

the Alarm time is reached, the module displays on the DCE the configured Unsolicited Code:



AT#WAKE?

+WAKE: (Refer to [1] for the details.)
OK



NOTE:

When the module is in the "Alarm" mode, no "Network Activity" is allowed: it is not possible to receive or send Calls, SMS and any GSM/GPRS services. The only commands that are accepted by the module are: #WAKE and #SHDN.

3.9.5.7. Alarm Operation Example

In this example, the User is assumed to be developing a Meteorological Unit using a battery powered module. The Meteorological Unit requirement is to measure the weather conditions every hour and send an SMS message to the main server, indicating the weather status just measured. The User Application should minimize the power consumption, because the Meteorological Unit will be installed in a remote location and its battery must last as long as possible. To minimize the power consumption, the User Application should shut the module down as well the equipment that do not need to be powered up all the time. The module and the equipments will be woken up every hour for just the time needed to measure and send the required SMS message.

1. Set up the current time.

AT+CCLK="02/11/07,12:24:30+01"
OK

2. Set up the next alarm in order to program the GPIO6 pin to power up the equipment that do not need to be powered up all the time.

AT+CALA="02/11/07,13:24:30+01",0,6,"TIME TO MEASURE & SMS...!"
OK

3. Shut down the module and the equipment.

AT#SHDN
OK

The module and the selected equipment are powered off.

4. After an hour, when the programmed alarm time is over, the module turns itself ON in "Alarm Mode", forces high the GPIO6 pin, which turns on the power supply of the equipment and issues every three seconds the unsolicited code:

+CALA: TIME TO MEASURE & SMS...!

5. Stop the Alarm activity in the module (recognized by the +CALA unsolicited code) and force the module in operating mode:



AT#WAKE=0

OK

6. The equipment performs the weather measurements and by means of the module sends the SMS with the weather data.

7. Read the current time.

AT+CCLK?

+CCLK="02/11/07,13:24:47"

OK

8. Calculate and set up the next alarm in order to program the GPIO6 pin to power up the equipment that do not need to be powered up all the time.

AT+CALA="02/11/07,14:24:47+01",0,6,"TIME TO MEASURE & SMS...!"

OK

9. Shut down the module and the equipment.

AT#SHDN

OK

The module and the selected equipment are powered off.

This sequence is repeated every hour.



4. GPRS Operations

A short GPRS description is reported on the following sub-paragraph. For more information about GPRS connections and practical examples refer to [4].

4.1. Introduction

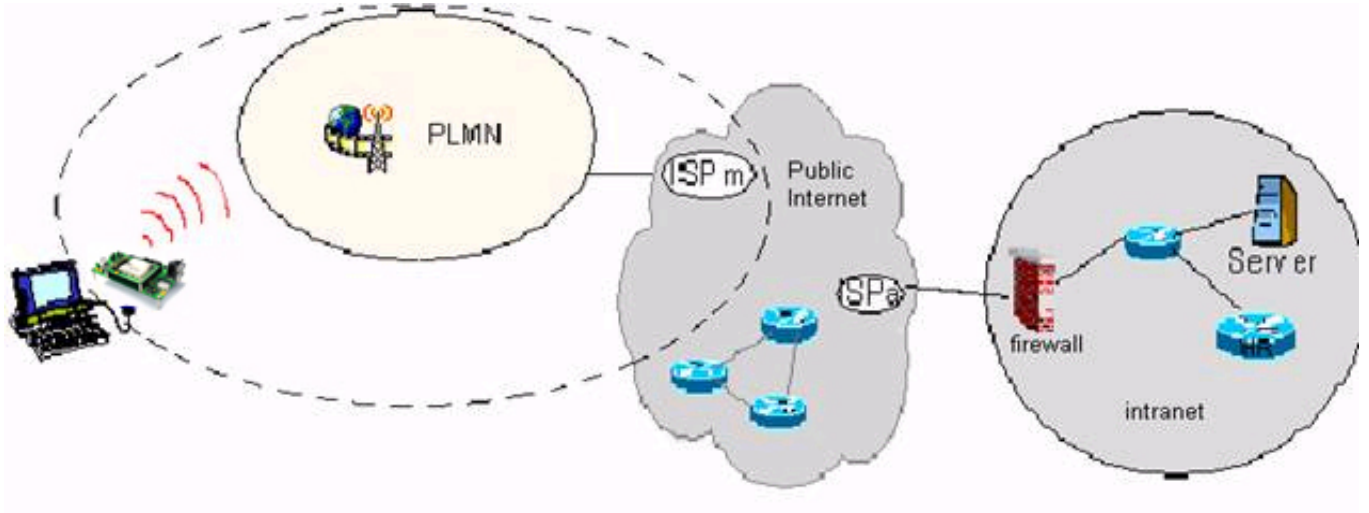
The General Packet Radio Services (GPRS) standard permits DATA transfers in a completely different way with respect to previous point to point communications made with Circuit Switch Data (CSD) GSM modems.

In CSD operations the modem establishes a connection with the other party (another modem) in such a way that all the Network devices in between are transparent to the data exchanged, simulating a real point to point connection, just as if the other party is directly connected with the controlling application of the modem. The other party can be either an Internet Service Provider (ISP) or a private server, but in any case, the arrival point must have a modem to connect to (Landline, ISDN or GSM CSD). The connection establishment procedure defines a particular path where all the information exchanged between the two peers flows and this path is reserved for exclusive use of these 2 peers for all the time the connection is active.

This approach has the drawbacks of a long time to set-up the link between the two peers (up to a minute) and a time counting bill which proceeds even if no data is exchanged because the path resources are reserved anyway; furthermore the speed of the data transfer is limited to 14400 bps.

An example of this kind of operation is shown in the following picture, where the point to point connection is between the two peers as if all the devices inside the dashed line are not present:

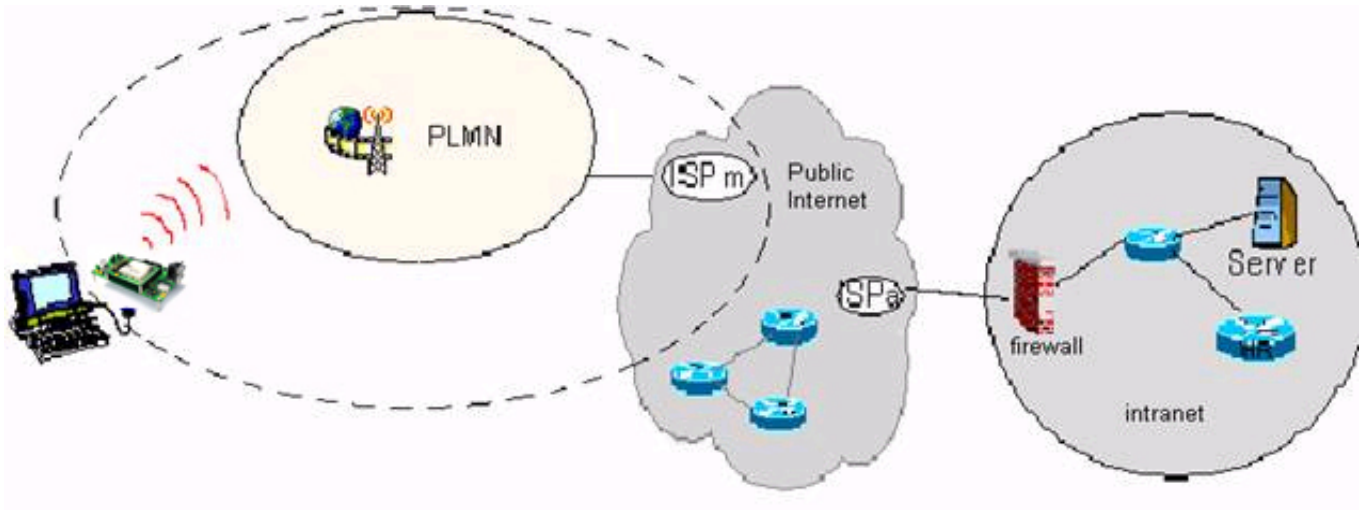




CSD interconnectivity

In GPRS operations instead, the connection is made directly towards internet as if the GPRS modem was a network IP socket interface. There's no data path reserved for the data exchange between the two peers, instead the resources are allocated dynamically on demand and the data exchanged is organized into packets typically TCP/IP, furthermore the maximum transfer speed can be much faster than GSM CSD.

An example of GPRS connection is shown in the following picture, where the GPRS connection is between the GPRS modem and the internet as if all the devices inside the dashed line are not present:



GPRS interconnectivity



Due to this kind of connection, when activating the GPRS connection you must provide the network parameters to enter through the internet point of the GPRS network ISP (Internet Service Provider) and not the phone number to be dialed; therefore it is not possible to establish a direct point to point GPRS connection between two modems as in CSD case, instead an internet tunneling must be done to achieve a point to point connection between two peers.

This approach as the immediate advantage of projecting the controlling application of the GPRS modem directly on the internet, ready to be accessed virtually from anywhere in the world at the same cost on the GPRS; actually the billing of the GPRS connection is based on the amount of data exchanged (number of packets transferred) independently from the time the connection is active or where these packet must be delivered. Therefore, it is possible to leave the controlling application always connected and ready to receive/send data on demand, while paying only for the data really exchanged.

The drawback of the GPRS connection is that the controlling application must have its own TCP/IP protocol stack embedded to decode the packets that arrive from GPRS and encode the ones to be sent through the internet.

There are few considerations than must be done on the GPRS connections:

- The GPRS connection speed with a GPRS class 10 multislots device is asymmetrical, 3 time slots in reception (43200 bps max) and 2 time slot in sending (28800 bps max) or 4 time slots in reception (57600 bps max) and 1 time slot in sending (14400 bps max).
- The controlling application of the module must have a TCP/IP - PPP software stack to interface with the GPRS modems.
- The controlling application must relay on some ISP that may be the Network Operator of the SIM to gain access to the internet through the GPRS connection.
- Because of the point before, the receiving application must have internet access as well.
- Since the communication is based upon TCP/IP packets, it is possible to talk simultaneously with more than one peer.
- When required, the data security in internet must be guaranteed by security protocols over the TCP/IP that must be managed by the controlling application.



5. GPS Operations

The present section is applicable only to the **Telit Modules** supporting GPS functions. They are summarized in the following table.

GM Family (Modem)	
Product:	Part Number
GM862-GPS	GM862GPS***T***
GE Family (Embedded)	
Product:	Part Number
GE863-GPS	GE863GPS***T***

5.1. Introduction

The **Telit Modules** providing GPS features are equipped with a SiRFStar III GPS Receiver that is controlled by means dedicated set of AT commands or dedicated NMEA sentences, refer to [8]. The following paragraphs provide the User with a description about the use of the NMEA sentences and the AT commands.

5.2. GPS Serial Ports

The figures below (fig. 6 and fig. 7) show the two GPS Serial port configurations supported by **Telit Modules**. GPS Serial Ports types are the following:

- **SIRF BINARY:** This port runs GPS navigation data in SIRF BINARY format. This protocol is not object of the present document.
The factory configuration is 57600 bps, 8, n, 1, where it is applicable.
- **NMEA:** This port runs GPS navigation data in NMEA 0183 format.
The factory configuration is 4800 bps, 8, n, 1

For detailed information about setting of the physical GPS Serial Ports types provided by the **Telit Modules** refer to [3]. Refer to [6] for “external module jumper setting example”.



5.3. WGS 84

GPS receivers perform initial position and velocity calculations using an earth-centered earth-fixed (ECEF) coordinate system. Results may be converted to an earth model (geoid) defined by the selected datum, as e.g. refer to [10].

For **Telit Modules** the default datum is WGS 84 (World Geodetic System 1984) which provides a worldwide common grid system that may be translated into local coordinate systems or map datums. (Local map datums are a best fit to the local shape of the earth and not valid worldwide).

5.4. NMEA 0183 Protocol

The NMEA 0183 is the specification created by the NMEA that defines the interface between marine electronic equipments. The standard permits marine electronics to send information to computers and to other marine equipments. GPS receiver interface is defined within this specification. The actually supported version is 2.2.

NMEA 0183 Protocol enables the **Telit module** User to communicate with the GPS Receiver using the NMEA Serial Port.

5.4.1. NMEA Output Messages

As factory configured, the GPS provides the User with the following sentences continuously sent on NMEA Serial Port: GGA, GSA, GSV, RMC. In order to enable the VTG and GLL sentences as well, the User can use the NMEA command \$PSRF103, refer to § 5.4.2.1.2.

GGA	Time, position and fix type data.
GLL	Latitude, longitude, UTC time of position fix and status.
GSA	GPS receiver operating mode, satellites used in the position solution and DOP values.
GSV	The number of GPS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
VTG	Course and speed information relative to the ground.
RMC	Time, date, position, course and speed data.



The factory configured Output NMEA sentences that the **Telit module** displays on the DTE with no interruption are the following:

```

.
.
.
$GPGGA,065049.000,4542.8078,N,01344.2698,E,1,07,1.2,268.1,M,45.2,M,,0000*5F
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPRMC,065049.000,A,4542.8078,N,01344.2698,E,0.25,103.45,190508,,,A*66
$GPGGA,065050.000,4542.8077,N,01344.2698,E,1,07,1.2,267.9,M,45.2,M,,0000*5F
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPRMC,065050.000,A,4542.8077,N,01344.2698,E,0.15,131.12,190508,,,A*61
$GPGGA,065051.000,4542.8077,N,01344.2698,E,1,07,1.2,267.8,M,45.2,M,,0000*5F
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPGSV,3,1,11,32,77,037,33,11,69,292,31,20,44,253,26,14,34,050,32*7E
$GPGSV,3,2,11,19,32,174,25,28,12,287,26,17,12,321,33,23,07,195,25*7D
$GPGSV,3,3,11,31,07,111,19,22,06,062,,03,04,166,18*48
$GPRMC,065051.000,A,4542.8077,N,01344.2698,E,0.10,306.95,190508,,,A*6C
$GPGGA,065052.000,4542.8076,N,01344.2697,E,1,07,1.2,267.5,M,45.2,M,,0000*5F
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPRMC,065052.000,A,4542.8076,N,01344.2697,E,0.15,185.15,190508,,,A*65
$GPGGA,065053.000,4542.8076,N,01344.2697,E,1,07,1.2,267.3,M,45.2,M,,0000*58
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPRMC,065053.000,A,4542.8076,N,01344.2697,E,0.32,198.79,190508,,,A*67
$GPGGA,065054.000,4542.8074,N,01344.2696,E,1,07,1.2,267.1,M,45.2,M,,0000*5E
$GPGSA,A,3,20,11,32,28,17,19,14,,,,,,,,1.9,1.2,1.5*3F
$GPRMC,065054.000,A,4542.8074,N,01344.2696,E,0.46,205.36,190508,,,A*6C
.
.
.

```

The following sub-paragraphs describe the structure and the parameters meaning of the output NMEA sentences running on the dedicated serial port. Next section (5.4.2) describes the NMEA sentences that the User can send to the GPS receiver.



5.4.1.5. RMC - Recommended Minimum Specific GNSS Data

RMC sentence reports Time, date, position, course and speed data. Table H contains the values for the following example:

\$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598,,*10

Table H: RMC Data Format

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation		degrees	E=east or W=west
Mode	A		A=Autonomous, D=DGPS, E=DR
Checksum	*10		
<CR> <LF>			End of message termination



NOTE:

SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.



5.4.2. NMEA Input Messages

NMEA input messages enable the User to control the GPS Receiver using the NMEA Serial Port, refer to [11].

5.4.2.1. Transport Message

The message syntax is explained in the following table:

Start Sequence	Payload	Checksum	End Sequence
\$PSRF<MID>	Data	*CKSUM	<CR> <LF>

Field Description:

\$PSRF<MID>

This identifies the command and the parameter <MID> (called Message Identifier) consists of three numeric characters. Input messages begin at MID 100.

The following table resumes the available commands:

Message	Name	Description
100	Set Serial Port	Set serial port parameters
103	Query / Rate Control	Query standard NMEA message and/or set output rate
105	Development Data On/Off	Development Data messages On/Off
106	Select Datum	Selection of datum used for coordinate transformations

Data

This field is depending to the selected command. Refer to a specific message section for <data> definition.



The following table describes the command fields:

Name	Example	Unit	Description
Message ID	\$PSRF100		PSRF100 protocol header
Protocol	1		1=NMEA
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200
DataBits	8		8,7
StopBits	1		0,1
Parity	0		0=None, 1=Odd, 2=Even
Checksum	*0D		
<CR><LF>			End of message termination



doing that, the User must physically connect the ASC1 with the serial port A SIRF BINARY, for details about physical connection refer to [6].

AT\$GPSD=<device type>

For parameter details refer to [1].

Responses:

- \$GPSD: (Refer to [1] for the details.)
OK
- OK
- ERROR
- +CME ERROR: XXX (Refer to [1] for the details.)

Examples

Checking the current mode on the GM862-GPS module:

```
AT$GPSD?
$GPSD: 2
OK
```

NOTE: Device type = 2 indicates that ASC1 is connected to Serial Port A SIRF BINARY, as shown on fig. 6.

Not supporting the device type 0 on the GM862-GPS module:

```
AT$GPSD=0
+CME ERROR: operation not supported
```

Supporting only the device type 2 on the GM862-GPS module:

```
AT$GPSD=2
OK
```



NOTE:

AT\$GPSD command has a different operation when used on GM862-GPS or on GE863-GPS, for details refer to [1].

5.5.2. NMEA Sentences on MODEM Serial Port #0

By means of the following AT command, the NMEA sentences can also be available on MODEM Serial Port #0 (ASC0, see fig. 6). The same feature is also available in GPS serial port configuration A & B (see fig. 7) if the external module circuitry supports the



physical connection between Serial Port A SIRF BINARY and ASC1, the connection is up to the USER.

AT\$GPSNMUN=<enable>[,<GGA> ,<GLL> ,<GSA> ,<GSV> ,<RMC> ,<VTG>]

For parameter details refer to [1].

Responses:

- \$GPSNMUN: (Refer to [1] for the details.)
- OK
- ERROR

Examples

Checking the range of the values supported by the AT command.

AT\$GPSNMUN=?

\$GPSNMUN: (0-3) , (0,1) , (0,1) , (0,1) , (0,1) , (0,1) , (0,1)
OK

Enabling the entire set of the NMEA sentences running on MODEM Serial Port #0 (ASC0, fig. 6).

AT\$GPSNMUN=1,1,1,1,1,1,1,

OK

\$GPSNMUN:

\$GPGGA,080028.999,4542.8011,N,01344.2644,E,1,07,1.2,260.5,M,45.2,M,,0000*58

\$GPSNMUN: \$GPGLL,4542.8011,N,01344.2644,E,080028.999,A,A*5B

\$GPSNMUN:

\$GPRMC,080028.999,A,4542.8011,N,01344.2644,E,1.14,257.62,190508,,A*69

\$GPSNMUN: \$GPVTG,257.62,T,,M,1.14,N,2.12,K,A*3C

\$GPSNMUN:

\$GPGSV,3,1,09,19,02,171,17,23,38,199,38,17,32,300,31,20,71,292,34*75

\$GPSNMUN:

\$GPGSV,3,2,09,31,24,084,23,13,04,208,27,11,72,175,28,14,08,039,20*78

\$GPSNMUN: \$GPGSV,3,3,09,32,48,061,23*4B

\$GPSNMUN: \$GPGSA,A,3,14,17,20,31,11,23,32,,,,,,1.2,*32

\$GPSNMUN:

\$GPGGA,080029.999,4542.8011,N,01344.2646,E,1,07,1.2,259.7,M,45.2,M,,0000*53



```

$GPSNMUN: $GPGLL,4542.8011,N,01344.2646,E,080029.999,A,A*58
$GPSNMUN:
$GPRMC,080029.999,A,4542.8011,N,01344.2646,E,0.29,67.31,190508,,
,A*52
$GPSNMUN: $GPVTG,67.31,T,,M,0.29,N,0.54,K,A*04
$GPSNMUN:
$GPGSV,3,1,09,19,02,171,17,23,38,199,38,17,32,300,31,20,71,292,3
4*75
$GPSNMUN:
$GPGSV,3,2,09,31,24,084,23,13,04,208,27,11,72,175,27,14,08,039,2
0*77
$GPSNMUN: $GPGSV,3,3,09,32,48,061,23*4B
$GPSNMUN: $GPGSA,A,3,14,17,20,31,11,23,32,,,,,,,,,1.2,*32
$GPSNMUN:
$GPGGA,080030.999,4542.8012,N,01344.2650,E,1,07,1.2,259.0,M,45.2
,M,,0000*58
$GPSNMUN: $GPGLL,4542.8012,N,01344.2650,E,080030.999,A,A*54
$GPSNMUN:
$GPRMC,080030.999,A,4542.8012,N,01344.2650,E,0.60,69.94,190508,,
,A*52
$GPSNMUN: $GPVTG,69.94,T,,M,0.60,N,1.11,K,A*08
$GPSNMUN:
$GPGSV,3,1,09,19,02,171,17,23,38,199,38,17,32,300,31,20,71,292,3
4*75
$GPSNMUN:
$GPGSV,3,2,09,31,24,084,23,13,04,208,19,11,72,175,27,14,08,039,2
0*7A
$GPSNMUN: $GPGSV,3,3,09,32,48,061,23*4B

```

Disabling the entire set of the NMEA sentences running on MODEM Serial Port #0 (ASCO, fig. 6).

```

AT$GPSNMUN=0
OK

```

5.5.3. Power Control of GPS Receiver

The GPS Receiver is switched on at the first Power ON (by default). The following AT command is used to switch on/off the GPS side. The GPS Receiver is usable if the GSM module is switched on (or in power saving).



5.5.5. GPS Antenna Management

The GPS Receiver needs an active antenna. The antenna can be powered by the module (default configuration). AT command used to select power source of the GPS antenna..

AT\$GPSAT=<type>

For parameter details refer to [1]

Responses:

- \$GPSAT:(Refer to [1] for the details.)
- OK
- ERROR
- +CME ERROR: XXX (Refer to [1] for the details.)

Examples

Checking the range of available values supported by the module

AT\$GPSAT=?

\$GPSAT: (0,1)

OK

Checking if the GPS antenna is supplied by the module itself

AT\$GPSAT?

\$GPSAT: 1

OK

Note: 1 means that the GPS antenna is supplied by the module itself.

5.5.5.1. GPS Antenna Current and Voltage Readout

AT command used to check the GPS antenna voltage supply. It is working when the GPS antenna is supplied by the module itself.

AT\$GPSAV?

For parameter details refer to [1].

Responses:

- \$GPSAV:(Refer to [1] for the details.)
- OK

AT command used to check the GPS antenna current consumption. It is working when the GPS antenna is supplied by the module itself.

AT\$GPSAI?



For parameter details refer to [1].

Responses:

- \$GPSAI :[Refer to [1] for the details.]
- OK

Examples

Checking the GPS antenna voltage supply:

AT\$GPSAV?

\$GPSAV : 3800

OK

NOTE: It means 3,8 V dc.

Checking the GPS antenna current consumption:

AT\$GPSAI?

\$GPSAI : 18

OK

NOTE: Measured current in mA, GPS antenna consumption limits.



5.5.6. Saving GPS Parameters

AT command used to save the set parameters in the module memory.

```
AT$GPSSAV<cr>  
OK
```



NOTE:

After this command restart the module to make active the modifications.

5.5.7. Restoring GPS Parameters

AT command used to restore the factory default parameters for the GPS module

```
AT$GPSRST<cr>  
OK
```



NOTE:

After this command restart the module to make active the modifications.

5.5.8. Reading Acquired GPS Position

AT command used to read the acquired position of the GPS Receiver.

```
AT$GPSACP<cr>
```

Responses:

- \$GPSACP: (Refer to [1] for the details.)
- OK

Example

Checking the acquired GPS position.

```
AT$GPSACP  
$GPSACP:080220,4542.82691N,01344.26820E,259.07,3,2.1,0.1,0.0,0.0  
,270705,09  
OK
```



5.5.9. Setting the GPS Module in Power Saving Mode

AT command used to set the GPS module in Power saving mode.

AT\$GPSPS=<mode> [,<PTF_Period>]<cr>

For parameter details refer to [1].

Responses:

- \$GPSPS:[Refer to [1] for the details.]
- OK
- ERROR
- +CME ERROR: XXX (Refer to [1] for the details.)

Examples

Checking the range of available values supported by the module

AT\$GPSPS=?

\$GPSPS: (0-2) , (0-300000)
OK

Checking the current values.

AT\$GPSPS?

\$GPSPS: 0,1800
OK

NOTE: 0 means full power mode. The receiver turns on periodically, every 1800 sec [default value].



NOTE:

The AT\$GPSPS command can only be executed in the controlled mode.

NOTE:

When the Push to fix mode is activated the GPS part will be switched off immediately; It is necessary only for the first fix to provide the AT\$GPSWK command; the receiver will perform the FIX and then it will start the OFF cycle as set with the command.





NOTE:

When the Push if the GPS module is in push-to-fix mode, issuing \$GPSWK permits to wake up it before the push to fix period; after the new fix the GPS module will return in push-to-fix mode with the same parameters.

NOTE:

If the GPS module is in trickle power mode, it will start up, make the fix and then continue to work in power saving mode.



6. Service and Firmware Update

The **Telit Modules** firmware is updated through the Serial Interface normally used for the AT Commands.

It is suggested to provide an RS232 interface on the User Printed Circuit Board (where the **Telit Module** is soldered) to perform the physical connection between the **Telit module** and a Windows-based PC. That simple circuitry makes the firmware updating easy when a new firmware version is released.

During the User Application development or evaluation phase of the **Telit module**, the RS232 interface or the USB port implemented on the **Telit Evaluation Kit (EVK2)** [6] can be used to connect the **Telit module** to a Windows-based PC on which a dedicated tool for firmware updating is running.

Telit provides the User with two tools to update the firmware of the module. The following paragraphs describe them.



NOTE:

GT terminals are complete encased modems. They do not need the Telit Evaluation Kit (EVK2) to perform testing, evaluation and also Firmware Update. The standard RS232 port is used to perform firmware update.

6.1. Xfp Tool

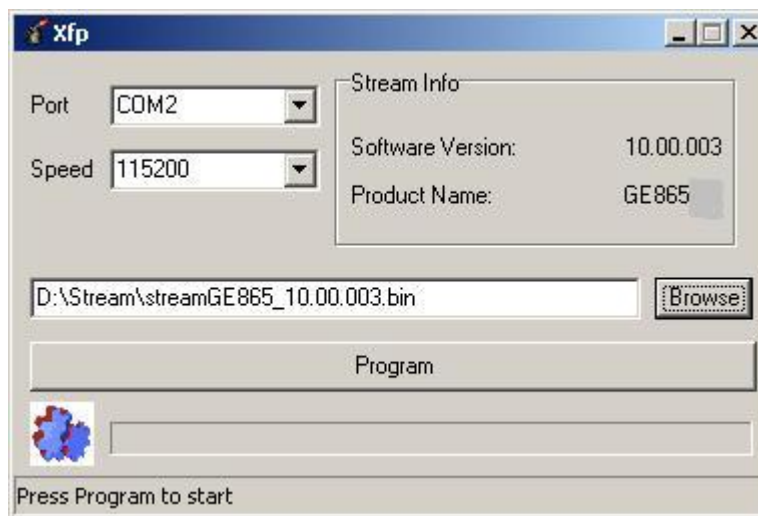
The firmware update of the module can be performed with the Xfp Tool provided by Telit. It runs on Windows based PCs. It erases the flash memory content, and then it downloads the new firmware on the flash memory.



6.1.1. Step-by-Step Upgrade Procedure

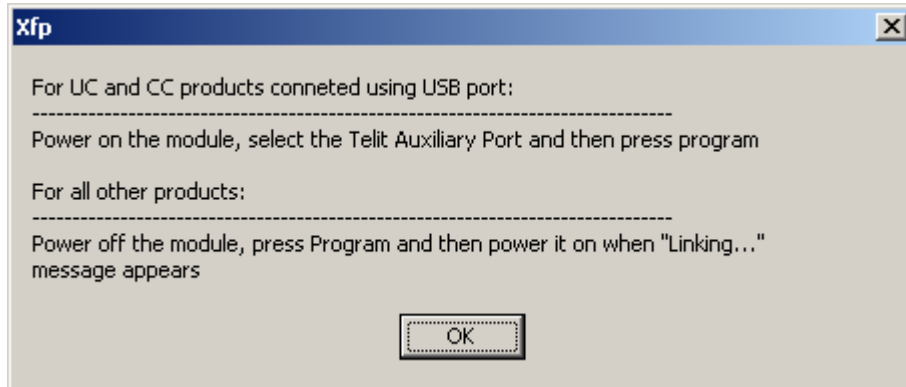
To update the **Telit Module** firmware follow the procedure:

1. collect information about the **Telit Module** and Software version using the following AT commands:
 - **AT+CGMR<cr>**, returns the Software version information;
 - **AT+CGMM<cr>**, returns the **Telit Module** identification.
2. Switch OFF the Telit Module.
3. Run the Xfp.exe tool, the following windows are displayed. Select COM port, speed¹² and stream file (stream file holds new firmware). For UC and CC products use the Telit Auxiliary Port, refer to document [15].

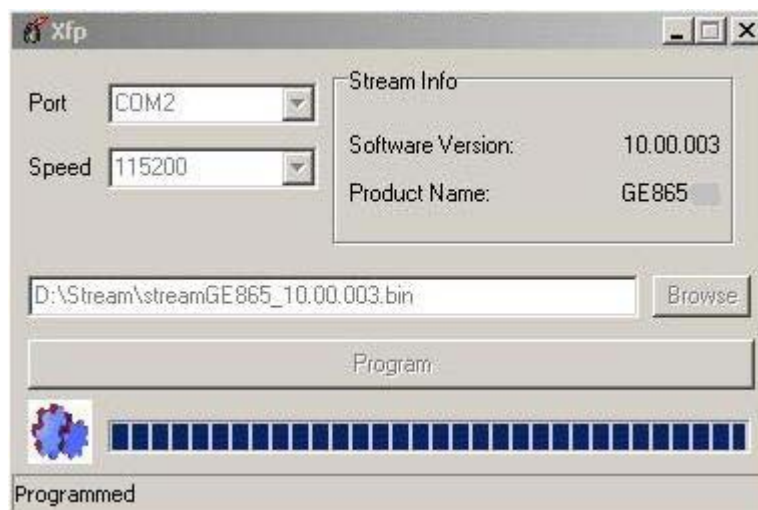


¹² To use speed greater than 115200 Bps a dedicated hardware on PC is needed.





4. After reading the instructions press OK button and follow them. The following windows are displayed on the screen when the module is successfully programmed.



5. Now the Telit module is programmed with the new firmware. Press OK button and exit the tool.



6.1.1.1. Upgrade Procedure using the Command Line

The **Telit Module** Upgrade Procedure can be performed by means of a command line running the Xfp tool in MS-DOS environment.

The command line is (use a space between two consecutive parameters):

```
Xfp stream_file port speed [autoterminate] [linktimeout]
```

Where:

Xfp	is the tool described on paragraph 6.1.1;
stream_file	file that must be downloaded (full path);
port	COM1, COM2, ..., in accordance with the hardware PC configuration;
speed	9600, ..., in accordance with the hardware PC configuration;
autoterminate	if 0: Xfp doesn't exit at the downloading end, regardless of the result of the just performed activity; if 1: the Xfp exits at the downloading end, regardless of the result of the just performed activity; Default value = 0.
linktimeout	linktimeout value expressed in sec. Suggested range: 5 ÷ 60 [sec]. Default value = 60 [sec]. If linktimeout is used, must be used also autoterminate parameter.

Exit Codes:

0	OK
4	stream not found
5	can't open port
-4	link failure
-9	timeout / error
-11	speed error

Exit Codes are displayed on the screen when Xft tool is closed.



To avoid the manual entry of the parameters above listed, the following example of VBScript can be used:

```
=====
'
'      TELIT COMMUNICATIONS S.P.A
'      VBScript Source File Name: XfpDOS.VBS
'      14th June 2010
'
=====

Dim WshShell
Dim oExec
Set WshShell = CreateObject("WScript.Shell")
Command = "c:\Program\Telit\xfp\Xfp.exe D:\Stream\streamGE865_10.00.003.bin COM2 115200 0 60"
WScript.Echo "Start: " & Now()
WScript.Echo "Executing: " & Command
Set oExec = WshShell.Exec(Command)
Do While oExec.Status = 0
    WScript.Sleep 100
Loop
WScript.Echo "ExitCode: " & oExec.ExitCode
WScript.Echo "Stop: " & Now()
WScript.Quit
=====
```

To run the XfpDOS.VBS script, follow these steps:

- 1) Enter MS-DOS environment
- 2) CSCRIPT XfpDOS.VBS <CR>



7. Acronyms and Abbreviations

CTM	Cellular Text Telephone Modems
CTS	Clear To Send
DCE	Data Circuit-Terminating Equipment (refer to [14])
DTE	Data Terminal Equipment (refer to [14])
DTMF	Dual Tone Multiple Frequency
DTR	Data Terminal Ready
IRA	International Reference Alphabet
ME	Mobile Equipment
MSISDN	Mobile Station International Subscriber Directory Number
NMEA	National Marine Electronics Association
PB	PhoneBook
PDU	Packet Data Unit
TE	Terminal Equipment (DTE or User Terminal)
TTY	Text Telephone Typewriter
UART	Universal Asynchronous Receiver Transmitter

