

Telit Modules Software User Guide

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This document is related to the following [Telit Modules](#):

| PRODUCT |
|----------------------------------|
| GM862-QUAD |
| GM862-QUAD-PY |
| GM862-GPS |
| GC864-QUAD |
| GC864-PY |
| GC864-QUAD w/SIM holder |
| GC864-PY w/SIM holder |
| GE863-PR03 128/64MB w/o Linux OS |
| GE863-PR03 128/64MB Linux OS |
| GE863-PR03 4/64MB w/o Linux OS |
| GE863-PR03 4/64MB Linux OS |
| GE863-PR03 with Linux OS |
| GE863-PR03 w/o Linux OS |
| GE864-QUAD Atex |
| GE864-QUAD Antenna |
| GE864-QUAD |
| GE864-QUAD V2 |
| GE864-PY |
| GE864-QUAD AUTOMOTIVE |
| GE864-QUAD AUTOMOTIVE V2 |
| GE865-QUAD |
| GT863-PY |
| GT864-QUAD |
| GT864-PY |



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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.

| | | | | | |
|--------------------|-----|------------------|-----|-----------------|----|
| +++ | 37 | AT\$GPSAV | 144 | AT+CMGW | 86 |
| AT | 15 | AT\$GPSD | 139 | AT+CMSS | 87 |
| AT#AUTOBND | 16 | AT\$GPSP | 142 | AT+CMUT | 33 |
| AT#BND | 15 | AT\$GPSPTS | 147 | AT+CNMI | 76 |
| AT#CAP | 31 | AT\$GPSR | 143 | AT+CNUM | 65 |
| AT#ENS | 29 | AT\$GPSRST | 146 | AT+COPS | 24 |
| AT#GPIO | 101 | AT\$GPSSAV | 146 | AT+CPBF | 45 |
| AT#HFMICG | 39 | AT\$GPSWK | 148 | AT+CPBR | 46 |
| AT#HSMICG | 40 | AT+ CGSMS | 91 | AT+CPBS | 42 |
| AT#MONI | 26 | AT+CALA | 111 | AT+CPBW | 47 |
| AT#SELINT | 17 | AT+CAPD | 117 | AT+CPIN | 18 |
| AT#SERVINFO | 28 | AT+CBST | 35 | AT+CPMS | 80 |
| AT#SGACT | 92 | AT+CCLK | 110 | AT+CPOL | 20 |
| AT#SHDN | 14 | AT+CFUN | 69 | AT+CRC | 50 |
| AT#SHFAGC | 40 | AT+CGATT | 91 | AT+CREG | 23 |
| AT#SHFEC | 40 | AT+CGDCONT | 92 | AT+CRSM | 64 |
| AT#SHFNRR | 40 | AT+CGMM | 15 | AT+CSCA | 74 |
| AT#SHFSD | 40 | AT+CGMR | 15 | AT+CSCB | 97 |
| AT#SHSAGC | 40 | AT+CGSMS | 91 | AT+CSCS | 82 |
| AT#SHSEC | 40 | AT+CLCK | 44 | AT+CSMP | 78 |
| AT#SHSNR | 41 | AT+CLIP | 51 | AT+CSQ | 24 |
| AT#SHSSD | 40 | AT+CLIR | 52 | AT+FCLASS | 31 |
| AT#SMSMODE | 76 | AT+CLVL | 33 | AT+IPR | 16 |
| AT#TTY | 40 | AT+CMEE | 16 | AT+VTD | 66 |
| AT#WAKE | 119 | AT+CMGD | 93 | AT+VTS | 66 |
| AT\$ GPSNMUN | 140 | AT+CMGF | 72 | ATA | 38 |
| AT\$GPSACP | 146 | AT+CMGL | 95 | ATD | 34 |
| AT\$GPSAI | 144 | AT+CMGR | 77 | ATH | 34 |
| AT\$GPSAT | 144 | AT+CMGS | 85 | | |



- GE864 Hardware User Guide, Telit document: 1v0300694
- GT863-PY Hardware User Guide, Telit document: 1v0300737
- [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

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. 1, reference [1], Tab. 3 Changed +ALARM into +CALA on § 3.7.5.7 |
| ISSUE#3 | 2010-01-26 | Added Ge864-QUAD Atex, GE864QUAD Antenna, GE863 Pro3 128/64, GE864-QUAD V2 and GE864-QUAD AUTOMOTIVE V2 |



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. 1 summarizes the Module Families in relation with the supported AT Interface Style: 0, 1, 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 |
| 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-PY | 0 | 1 | 2 |
| GE864-AUTO | - | - | 2 |
| GE865-QUAD | - | - | 2 |
| GT Family (Terminal) | | | |
| GT863-PY | 0 | 1 | 2 |
| GT864-QUAD | 0 | 1 | 2 |
| GT864-PY | 0 | 1 | 2 |

Tab. 1: Modules and supported AT Interface Styles



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  
07.02.604-A014  
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. 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:



2.4.6. SIM Checking

2.4.6.1. 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



2.4.6.2. 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.



2.4.6.3. 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.

2.4.6.4. 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




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



NOTE:

The new entry is written on first position.

2.4.7. Network checking

2.4.7.1. 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
```



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.

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:

<rsqi> = 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.

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:

```
o #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, see § 0. When mobile is registered query the mobile for network operator name and signal strength with #MONI command.



2.4.7.5. 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 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])
- BA list saving on the module (refer to [9], <CDR-NWS-140>)
- 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 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

2.5. 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 § 0) 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
```



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 devices², 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].

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



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.

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 Call³

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.

³ In GT863-PY and GT864-PY modules the audio hardware is not supported.



2.8. Enabling TTY Function

The characters entered through the TTY device, connected to the **Telit module** (see fig. 1), 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.

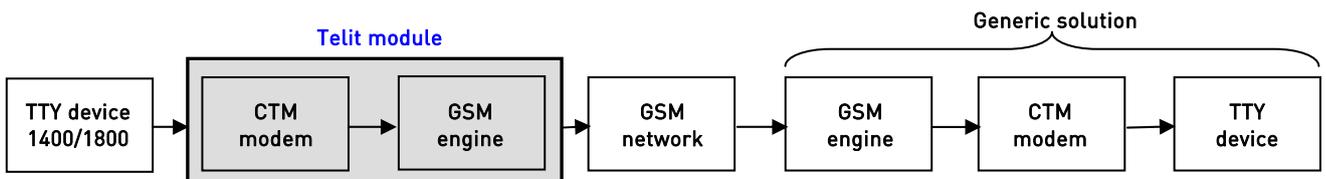


fig. 1: TTY device – module connection

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]):

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

AT#CAP=1

OK

- Setting the volume of the active audio path:

AT+CLVL=5

OK

- Setting the Hands Free microphone input gain:

AT#HFMICG=4

OK

- Disabling the side tone on Hands Free audio output:



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 § 2.4.6.



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, 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



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

```
ATD> 7
OK
```

3.2. Call Management

3.2.1. 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.

- Check the range value.

```
AT+CRC=?
+CRC: (0,1)
OK
```

- 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, then the module receives a call.

- 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

-
-
-

3.2.2. 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

3.2.3. 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.

3.2.3.1. 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.



3.2.4. 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.

3.2.4.1. 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].

3.2.4.2. 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.

3.2.4.3. 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



- 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 "OI" network facility. The network password provided by Network Operator is 2121.

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.

Locking "OI" network facility:

AT+CLCK=OI,1,2121

OK

Checking "OI" network facility status:

AT+CLCK=OI,2

+CLCK: 1,1

+CLCK: 1,8

+CLCK: 1,4

+CLCK: 1,2

OK

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

Unlocking "OI" network facility:

AT+CLCK=OI,0,2121

OK

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.

3.2.4.6. 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



3.2.4.7. 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.

3.3. 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



3.4. 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. 2). 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. 2: 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



3.5.1. 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), (0)
OK

NOTE: fun: 0, 1, 2, 4, 5; 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)



TIP:

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.

NOTE:

Applicable only to module provided with GPS feature.

The power saving for the GSM side is not activated if the GPS side is switched on.



3.5.2. Power saving modes

The following table describes the module functionality in the various CFUN modes:

| Event | Module is in CFUN MODE when the event (first column) happens | | | |
|-------------------------------------|--------------------------------------------------------------|-----------------------------|-----------------------------|---------------------------------------------------------------------------------------------|
| | <FUN>=0 | <FUN>=2 | <FUN>=4 | <FUN>=5 |
| RTS= OFF(high) → RTS=ON(low) | quit ⁶ | 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 ¹ | no effect | no effect | temporary (only during event) |
| Incoming voice/data call | quit ¹ | 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 |
| 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 ¹ | 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 ¹ | no effect | no effect | temporary (only during event) |
| AT+CFUN=1 | not possible, UART disabled | quit ¹ | quit ¹ | not possible, UART disabled |

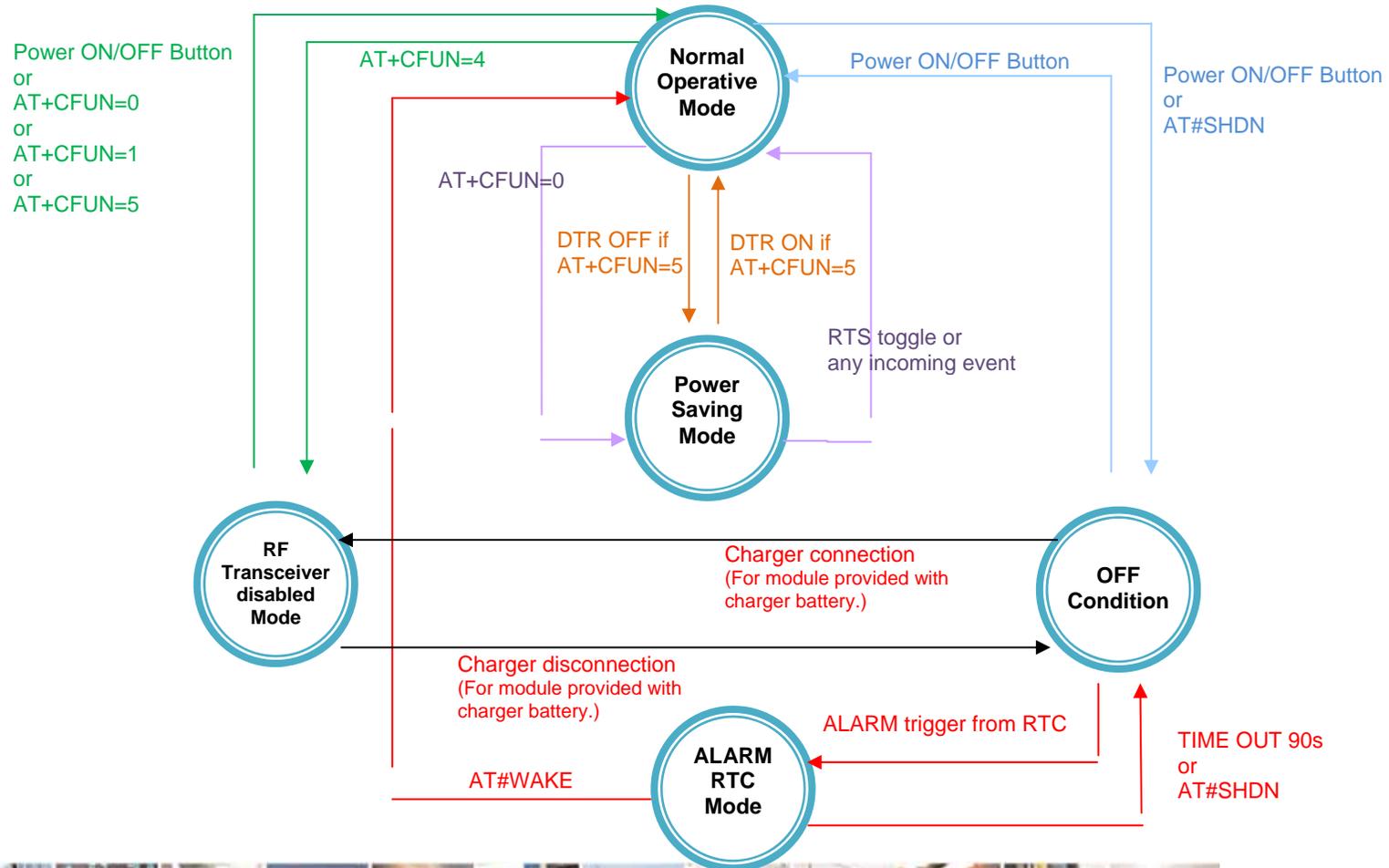
Tab. 3: CFUN modes

The levels are the CMOS levels.

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

⁶ Quit = module goes back to normal mode CFUN=1





3.6. 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.

3.6.1. Setting up Short Message Service

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

3.6.1.1. 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

Setting up the desired SMSC number in international format:

```
AT+CSCA=+393205858500,145
```

```
OK
```



TIP:

This setting remains stored in the SIM card until it is changed or deleted, so this operation may be done only once if the SIM Card is not changed. The setting is maintained even after power down.

Editing CSCA command with no SMSC number just to see the result:

```
AT+CSCA=,145
```

```
OK
```

Checking the stored SMSC number:

```
AT+CSCA?
```

```
+CSCA: "+",145
```

```
OK
```

Editing CSCA command with no SMSC number just to see the result:

```
AT+CSCA=,129
```

```
OK
```

Checking the stored SMSC number:

```
AT+CSCA?
```

```
+CSCA: "",129
```

```
OK
```

Enabling Extended result code in verbose format:

```
AT+CMEE=2
```

```
OK
```

Editing AT+CSCA with no parameters just to see the error result format:

```
AT+CSCA=
```

```
ERROR
```



3.6.1.4. 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
```

3.6.1.5. 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.
- <dc> 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.

3.6.1.6. 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



3.6.2. 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
```

3.6.2.1. 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".

3.6.2.2. 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



```
AT+CMGS=0033003200390030003500360039003600320038
> 004300490041004F
+CMGS: 81
OK
```

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

```
+CMTI: "SM", 3
```



NOTE:

The SMS was successfully sent to the SMSC and its Network reference number is 81. Do not confuse message reference with message index position: the first one indicates the Network reference for identifying the sent message, the second one - reported by the Unsolicited Indication - indicates that the message is received by the module and it is stored on the position 3 of the "SM" storage.

7. Select the "SMS" storage as indicated by the Unsolicited Indication.

```
AT+CPMS="SM"
+CPMS: 3, 50, 3, 50, 3, 50
OK
```

8. Read the message at the storage position indicated by the Unsolicited Indication.

```
AT+CMGR=3
+CMGR: "REC
UNREAD", "002B003300390033003200390030003500360039003600320038", "
0057
0049004E0044002000530049004D", "08/05/13, 12:22:08+08"
004300490041004F
OK
```



3.6.3. 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.

3.6.4. 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



3.6.5. 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





NOTE:

The SMS was successfully sent to the SMSC and its Network reference number is 76. Do not confuse message reference with message index position: the first one indicates the Network reference for identifying the sent message, the second one - reported by the Unsolicited Indication - indicates that the message is received by the module and it is stored on the position 1 of the "ME" storage.

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 THE MODULE ITSELF
OK
```

3.6.6. Sending a New SMS by means of the GPRS service

An SMS can be sent by means of the GPRS service.

AT+CGSMS=2

For parameter details refer to [1].

Responses:

- OK
- ERROR

Examples

Sending an SMS message to the module itself, not storing it before transition and use the GPRS service

1. Select suitable AT command interface style

AT#SELINT=2

OK

2. Select the GPRS service

AT+CGSMS=2

OK

3. Check if module is attached to GPRS service

AT+CGATT?

+CGATT: 1



OK

- Specify PDP context parameters values

AT+CGDCONT=1, "IP", "Access Point Name (APN)"

OK

- Activate PDP context and check the assigned temporary address

AT#SGACT=1,1["User Name","Password"]

#SGACT: assigned temporary address

- Select Text Mode.

AT+CMGF=1

OK

- 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

- 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

-

AT+CPMS="SM"

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

OK

- 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



3.6.7. 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.



3.6.8. 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

3.6.9. 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

3.6.10. 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 is 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 7.

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"⁷ broadcast message is displayed on the DTE.

⁷ The following list of Services can be provided by the Network Operator, it is not mandatory:

<mids> Service name
000 Index



+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

.
.

.

-
- 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)



| Families & Products | GPIO < PIN > description | | | | | | | | |
|-------------------------------|--------------------------|---------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------|--------------------------|---------------------------|
| | GPIO < pin > range | GPI Only Input pins | GPO Only Output pins | At startup the following GPIO's 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 GPIO's are maintained even after a Shutdown to permit "Alternate Functions" to be always properly set. | Alternate Functions | | | |
| | | | | | | RF TX Contr. See 3.7.4.1 | RF TX Mon. See 3.7.4.2 | ALARM Output See 3.7.4.3 | BUZZER Output See 3.7.4.4 |
| 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 |
| 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 |
| GE864-PY | 1 - 22 | N/A | N/A | 1 - 3; 8 - 22 | 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. 4: GPIO pins description



3.7.1. 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].

3.7.2. 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].

3.7.3. 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, 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.



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.

3.7.4.3.

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.



3.7.4.4. 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.

3.7.5. 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.

3.7.5.1. 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 behaviour 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.

3.7.5.2. 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].

3.7.5.3. Regulating the Alarm Time and Operations

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

AT+CALA="<time>",<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
.
.
.
.

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



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

the Alarm time is reached, the module displays on the DCE the configured Unsolicited Code set up yesterday! :

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

.
. .
. . .



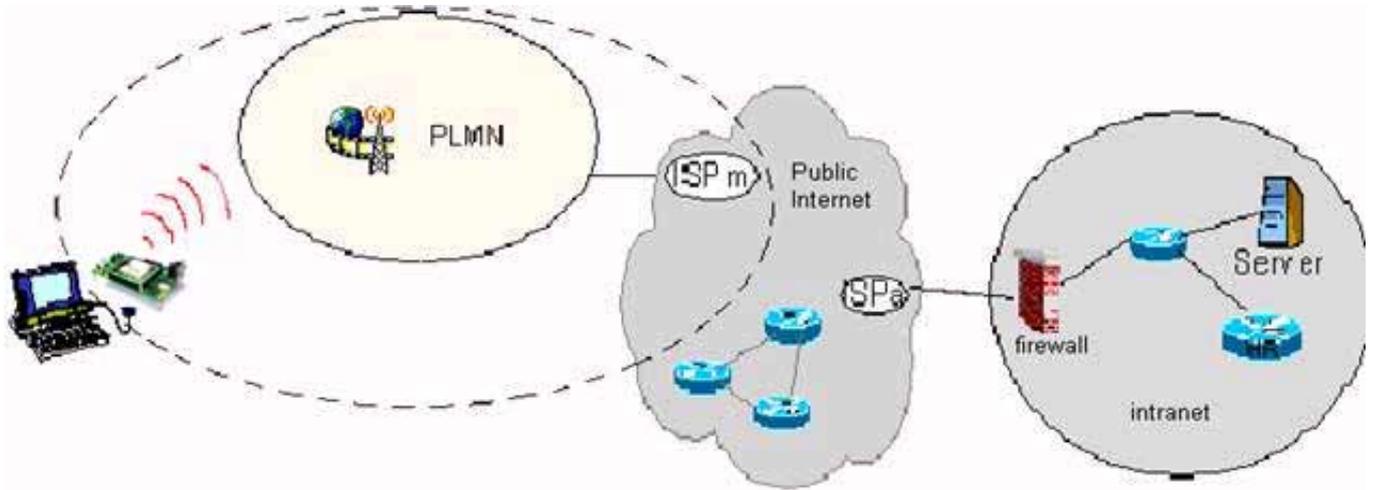
TIP:

The string time has to be encapsulated in double brackets. The Alarm time will not be computed for different time zone, therefore the Alarm time will always refer to the same time zone as the clock setting regardless the time zone set in the +CCLK command.

NOTE:

If GPIO6 pin is used as ALARM OUTPUT, it must be configured in "Alternate Function" (see § 3.7.4.3) otherwise the pin will not respond to the Alarm settings. In case the Alarm mode is equal to 1,3,7 then a dummy empty text is inserted "".

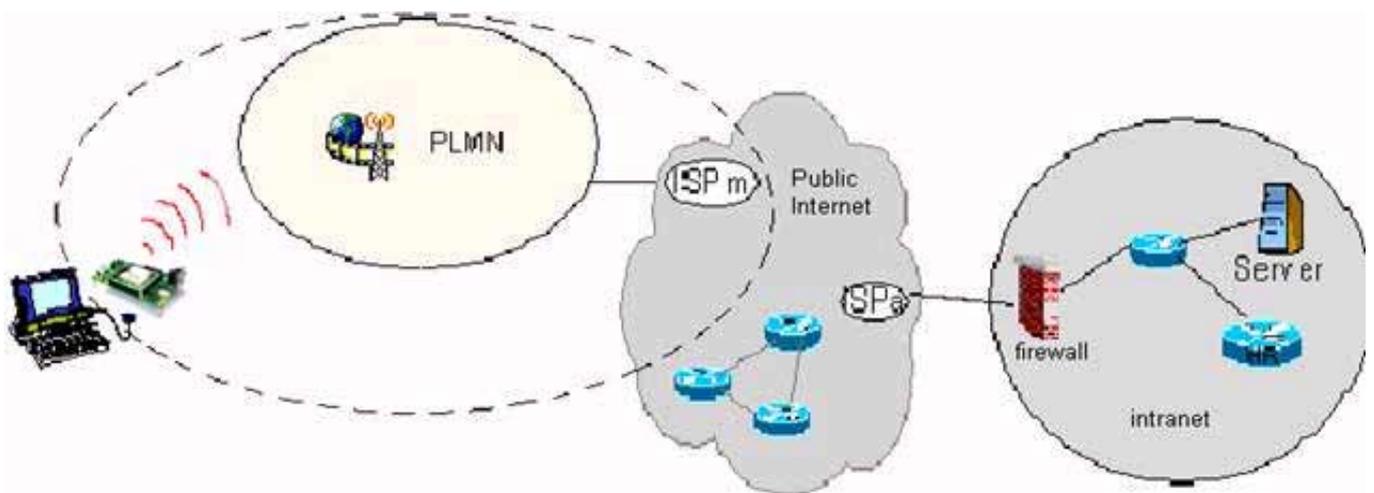




CSD interconnectivity

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***_*** |
| GE Family (Embedded) | |
| Product: | Part Number |
| GE863-GPS | GE863GPS***_*** |

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. 2 and fig. 3) 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”.



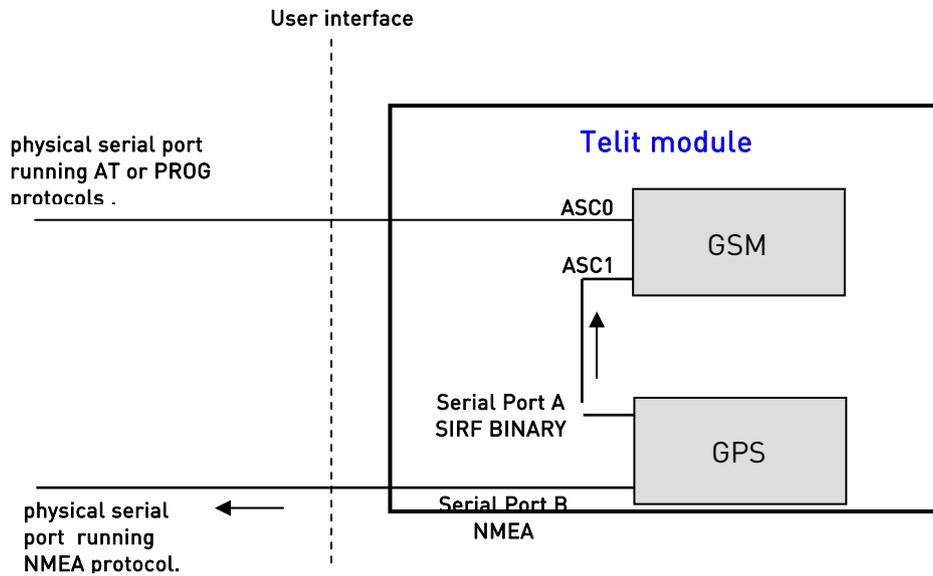


fig. 2: GPS serial port configuration: "B" (GM862-GPS)

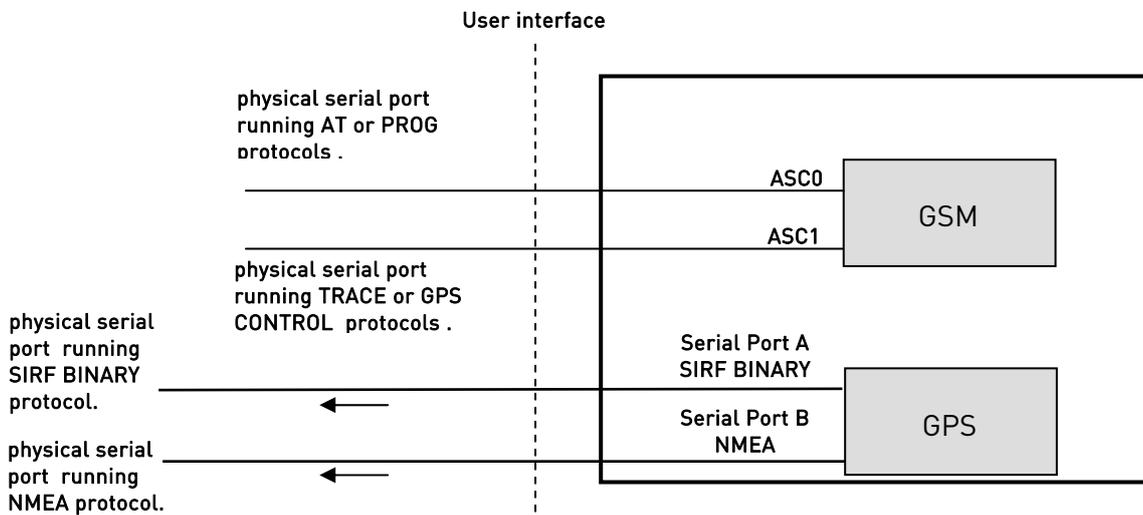


fig. 3: GPS serial port configuration: "A & B" (GE863-GPS)



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.



5.4.1.1. GGA - Global Positioning System Fixed Data

GGA sentence provides Time, position, and fix related data for a GPS Receiver. Table A contains the descriptions of the sentence displayed on the DTE using the following format:

```
$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M, , , ,0000*18
```

Table A

| Name | Example | Units | Description |
|------------------------|------------|--------|-----------------------------------|
| Message ID | \$GPGGA | | GGA protocol header |
| UTC Time | 161229.487 | | hhmmss.sss |
| 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 |
| Position Fix Indicator | 1 | | See Table B |
| Satellites Used | 07 | | Range 0 to 12 |
| HDOP | 1.0 | | Horizontal Dilution of Precision |
| MSL Altitude | 9.0 | meters | |
| Units | M | meters | |
| Geoid Separation | | meters | |
| Units | M | meters | |
| Age of Diff. Corr. | | second | Null fields when DGPS is not used |
| Diff. Ref. Station ID | 0000 | | |
| Checksum | *18 | | |
| <CR> <LF> | | | End of message termination |

Table B

| Value | Description |
|-------|---------------------------------------|
| 0 | Fix not available or invalid |
| 1 | GPS SPS Mode, fix valid |
| 2 | Differential GPS, SPS Mode, fix valid |
| 3-5 | Not supported |
| 6 | Dead Reckoning Mode, fix valid |



5.4.1.2. GLL - Geographic Position - Latitude/Longitude

GLL sentence provides latitude and longitude of vessel position, time of position fix and status. Table C contains the values for the following example:

\$GPGLL,3723.2475,N,12158.3416,W,161229.487,A,A*41

Table C

| Name | Example | Units | Description |
|---------------|------------|-------|-------------------------------------------------------------------|
| Message ID | \$GPGLL | | GLL protocol header |
| 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 |
| UTC Time | 161229.487 | | hhmmss.sss |
| Status | A | | A=data valid or V=data not valid |
| Mode | A | | A=Autonomous, D=DGPS, E=DR (Only present in NMEA version 3.00) |
| Checksum | *41 | | |
| <CR> <LF> | | | End of message termination |

5.4.1.3. GSA - GNSS DOP and Active Satellites

GSA sentence reports the GPS receiver's operating mode, satellites used in the navigation solution reported by the GGA sentence and DOP values. Table D contains the values for the following example:

\$GPGSA,A,3,07,02,26,27,09,04,15,, , , , , ,1.8,1.0,1.5*33

Table D: GSA Data Format

| Name | Example | Units | Description |
|--------------------------------------------------|---------|-------|----------------------------|
| Message ID | \$GPGSA | | GSA protocol header |
| Mode 1 | A | | See Table E |
| Mode 2 | 3 | | See Table F |
| Satellite Used1. Satellite used in solution.1 | 07 | | Sv on Channel 1 |
| Satellite Used1 | 02 | | Sv on Channel 2 |
| | | | |
| Satellite Used1 | | | |
| PDOP | 1.8 | | |
| HDOP | 1.0 | | |
| VDOP | 1.5 | | |
| Checksum | *33 | | |
| <CR> <LF> | | | End of message termination |



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.



5.4.1.6. VTG - Course Over Ground and Ground Speed

VTG sentence reports the actual course and speed relative to the ground. Table I contains the values for the following example:

\$GPVTG,309.62,T,M,0.13,N,0.2,K,A*23

Table I: VTG Data Format

| Name | Example | Units | Description |
|------------|---------|---------|----------------------------|
| Message ID | \$GPVTG | | VTG protocol header |
| Course | 309.62 | | Measured heading |
| Reference | T | | True |
| Course | | degrees | Measured heading |
| Reference | M | | Magnetic |
| Speed | 0.13 | knots | Measured horizontal speed |
| Units | N | Knots | |
| Speed | 0.2 | km/hr | Measured horizontal speed |
| Units | K | | Kilometers per hour |
| Mode | A | | A=Autonomous, D=DGPS, E=DR |
| Checksum | *23 | | |
| <CR> <LF> | | | End of message termination |



NOTE:

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



*CKSUM

CKSUM is a two-hex character checksum as defined in the NMEA specification [8]. Checksum consists of a binary exclusive OR the lower 7 bits of each character after the "\$" and before the "*" symbols. The resulting 7-bit binary number is displayed as the ASCII equivalent of two hexadecimal characters representing the contents of the checksum. Use of checksums is required on all input messages.

<CR> <LF>

Each message is terminated using Carriage Return (CR) Line Feed (LF) which is \r\n which is hex 0D 0A. Because \r\n are not printable ASCII characters, they are omitted from the example strings, but must be sent to terminate the message and cause the receiver to process that input message.



NOTE:

All fields in the SIRF proprietary NMEA messages are required, none are optional. All NMEA messages are comma delimited.

5.4.2.1.1. Message 100 – Set Serial Port

This command message is used to set the protocol the communication parameters (Baud, data bits, stop bits, and parity). When a valid message is received, the parameters are stored in battery-backed SRAM and the Receiver restarts using the saved parameters.

The command has the following syntax:

\$PSRF100,<protocol>,<baud>,<DataBits>,<StopBits>,<Parity>*<checksum><CR><LF>

Example: setting the serial port to 9600 Baud, 8, n, 1

\$PSRF100,1,9600,8,1,0*0D



5.4.2.1.2. Message 103 – Query / Rate Control

This command is used to control the output of standard NMEA messages GGA, GLL, GSA, GSV, RMC, and VTG. Using this command message, standard NMEA messages may be polled once, or setup for periodic output. Checksums may also be enabled or disabled depending on the needs of the receiving program. NMEA message settings are saved in battery-backed memory for each entry when the message is accepted.

The command has the following syntax:

\$PSRF103 ,<Msg> ,<Mode> ,<Rate> ,<Checksum Enable>* <checksum><CR><LF>

Querying the GGA message with checksum enabled:

\$PSRF103,00,01,00,01*25

Enabling VTG message for a 1 Hz constant output with checksum enabled:

\$PSRF103,05,00,01,01*20

Disabling VTG message:

\$PSRF103,05,00,00,01*21

Enabling VTG and GLL sentences:

\$PSRF103,05,00,01,01*20<CR><LF>

\$PSRF103,01,00,01,01*24<CR><LF>

The following table describes the command fields:

| Name | Example | Unit | Description |
|-------------|-----------|------|---------------------------------------|
| Message ID | \$PSRF103 | | PSRF103 protocol header |
| Msg | 00 | | See next table |
| Mode | 01 | | 0=Set rate, 1=Query |
| Rate | 00 | sec | Output off=0, max =255 |
| CksumEnable | 01 | | 0=Disable Checksum, 1=Enable Checksum |
| Checksum | *25 | | |
| <CR><LF> | | | End of message termination |



5.4.2.1.4. Message 106 – Select Datum

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. 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.)

The command has the following syntax:

\$PSRF106,<Datum>< checksum><CR><LF>

Examples

Datum select TOKYO_MEAN

\$PSRF106,178*32

The following table describes the command fields:

| Name | Example | Unit | Description |
|------------|-----------|------|---------------------------------------------------------------------------------------|
| Message ID | \$PSRF106 | | PSRF106 protocol header |
| Datum | 178 | | 21=WGS84 178=TOKYO_MEAN 179=TOKYO_JAPAN 180=TOKYO_KOREA 181=TOKYO_OKINAWA |
| Checksum | *32 | | |
| <CR><LF> | | | End of message termination |

5.5. AT Commands to Control GPS Receiver

After a right Power ON sequence of the **GPS Telit module** (GSM + GPS), the GSM side is ready to receive AT commands on the MODEM Serial Port #0 (ASC0, see fig. 2, fig. 3). The GPS receiver starts the scan of the available GPS signals and the NMEA sentences are present on the NMEA Serial Port, see § 5.4.

5.5.1. Controlled Mode

By means of the following AT command, the MODEM Serial Port #1 (ASC1, see fig. 3) of the GSM side is forced to run the GPS Control Protocol (SIRF BINARY format). After



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. 2.

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. 2). The same feature is also available in GPS serial port configuration A & B (see fig. 3) 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. 2).

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. 2).

```

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?



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$GPRST<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.



5.5.10. Wake Up GPS From Power Saving Mode

AT command used to wake up the GPS module from Power saving mode.

AT\$GPSWK<cr>

Responses:

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

Examples

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)

Waking up GPS receiver.

AT\$GPSWK

+CME ERROR: operation not supported

NOTE: Operation not supported because the GPS receiver is powered ON.

Powering down the GPS receiver.

AT\$GPSPS=2

OK

Waking up the GPS receiver.

AT\$GPSWK

OK



NOTE:

The AT\$GPSWK command can only be executed in the controlled 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

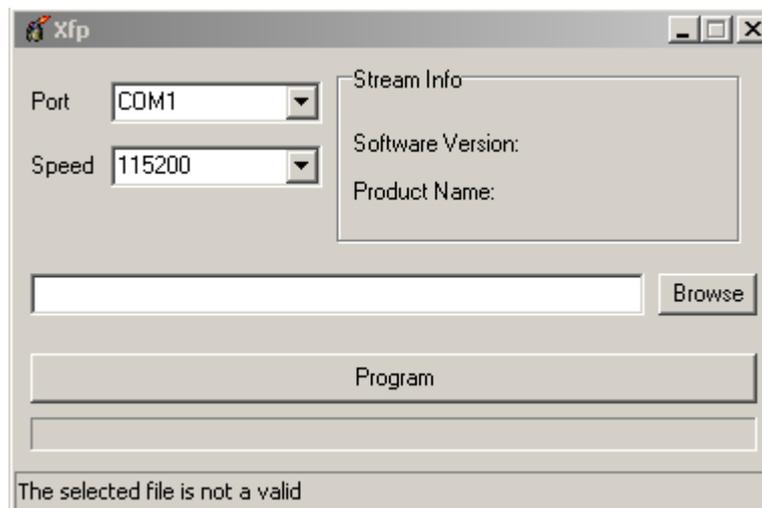
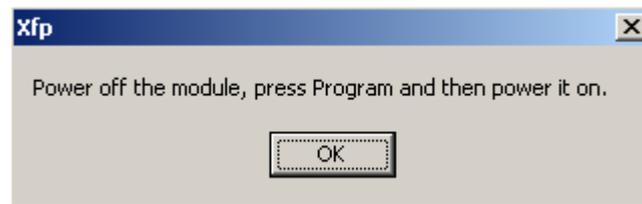
The firmware update of the module can be performed with the Xfp Tool provided by Telit. It runs on Windows based PCs. It erases the flash memory content, then it downloads the new firmware on the flash memory.



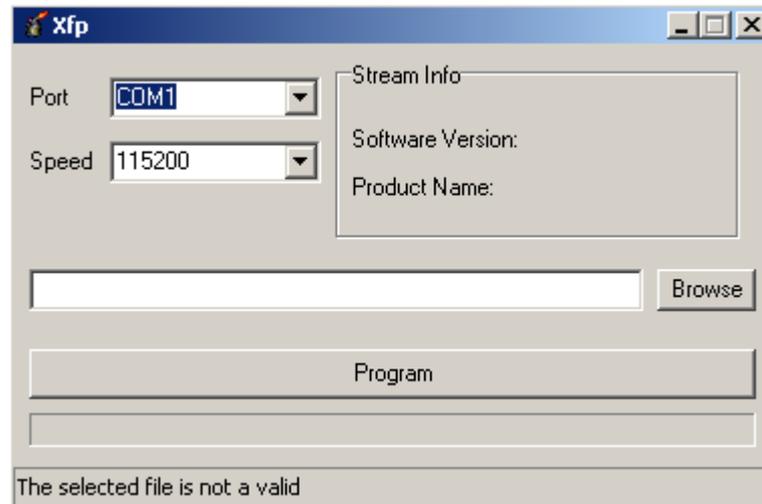
6.1.1. Step-by-Step Upgrade Procedure

To update the **Telit Module** firmware follow the procedure:

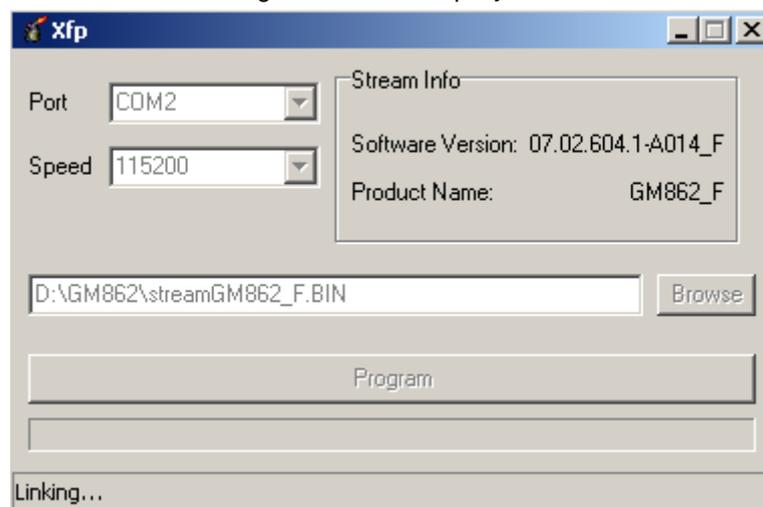
1. collect information about the **Telit Module** and Software version using the following AT commands:
 - **AT+CGMR<cr>**, returns the Software version information;
 - **AT+CGMM<cr>**, returns the **Telit Module** identification.
2. Switch OFF the Telit Module.
3. Run the *Xfp.exe* tool, the following windows are displayed. Power OFF the module if needed then press OK button



4. After pressing OK button on the screen is displayed only the following windows.



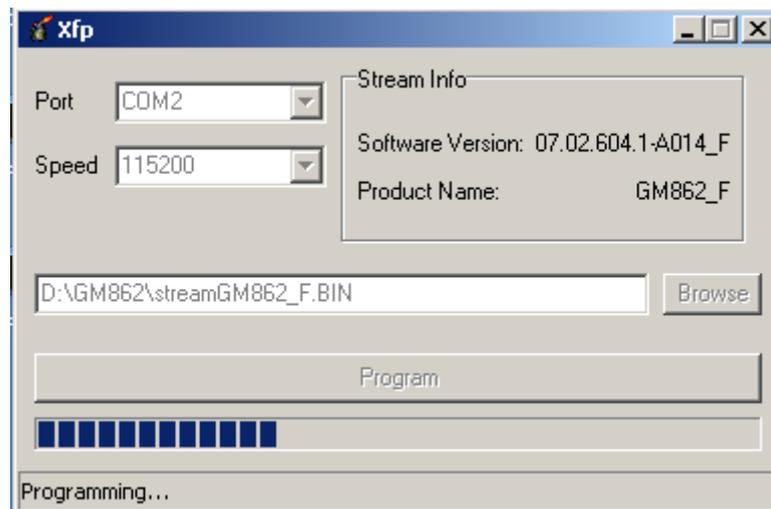
5. After selecting COM port, speed⁸ and stream file (stream files holds new firmware) press Program button, a flashing blue bar appears on the displayed window. The following window is displayed on the screen.



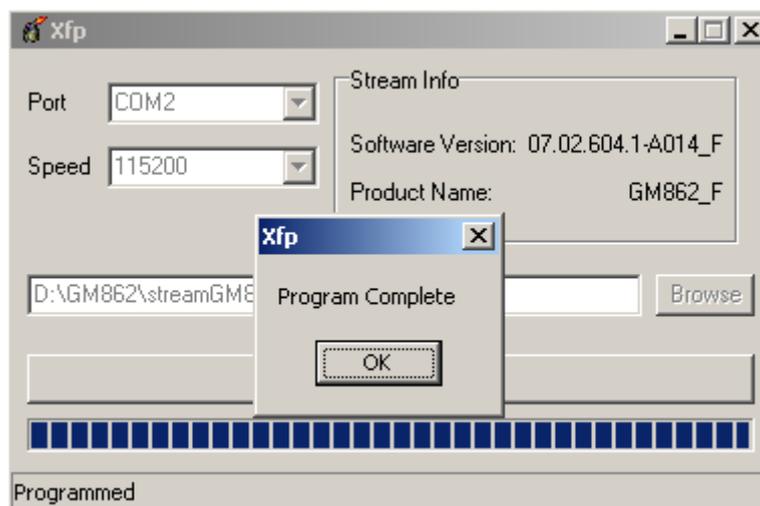
⁸ To use speed grater than 115200 Bps a dedicated hardware on PC is needed.



- After powering ON the module the following window is displayed on the screen. The programming is in progress



- The following window is displayed on the screen when the module is successfully programmed.



- Now the **Telit module** is programmed with the new firmware. Press OK button and exit the tool.



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 |

