

APPLICABILITY TABLE

	SW Versions	AT Ref. Guide	Standards		
GC Family (Compact)					
GC864-QUAD	10.00.xx4	[1]	GSM/GPRS		
GC864-QUAD V2	10.00.xx4				
GC864-DUAL V2	10.00.xx4				
GE/GL Family (Embedded)					
GE864-QUAD	10.00.xx4				
GE864-QUAD V2	10.00.xx4				
GE864-QUAD Automotive V2	10.00.xx4				
GE864-QUAD ATEX	10.00.xx4				
GE864-DUAL V2	10.00.xx4				
GE864-GPS	10.00.xx4				
GE865-QUAD	10.00.xx4				
GL865-DUAL	10.00.xx4				
GL865-QUAD	10.00.xx5				
GL868-DUAL	10.00.xx4				
GE910-QUAD	13.00.xx3				
GE910-QUAD AUTO	13.00.xx5				
GE910-GNSS	13.00.xx4				
GL865-DUAL V3	16.00.xx2				
GL865-QUAD V3	16.00.xx3				
GL868-DUAL V3	16.00.xx2				
GE910-QUAD V3	16.00.xx3				
GE866-QUAD	16.00.xx3				
GT Family (Terminal)					
GT863-PY	10.00.xx4				
GT864-QUAD	10.00.xx4				
GT864-PY	10.00.xx4				
HE910 Family					
HE910 ¹	12.00.xx4	[17]	HSPA-GSM/GPRS		
HE910-GA	12.00.xx4				
HE910-D	12.00.xx4				
HE910-EUR / HE910-EUD	12.00.xx4				
HE910-EUG / HE910-NAG	12.00.xx4				
HE910-NAR / HE910-NAD	12.00.xx4				
UE/UL Family (Embedded)					
UE910-EUR / UE910-EUD	12.00.xx4				
UE910-NAR / UE910-NAD	12.00.xx4				
UL865-EUR / UL865-EUD	12.00.xx4				
UL865-NAR / UL865-NAD	12.00.xx4				
UL865-N3G	12.00.xx4				

Note: the features described by the present document are provided by the products equipped with the software versions equal or higher than the versions shown in the table.

To get more information on the AT commands syntax, see document [1] or [17] in accordance with the products indicated in the table.

The rules used to describe the AT Commands usage concerning different products or software versions are illustrated in chapter 2.

¹ HE910 is the “type name” of the products marketed as HE910-G & HE910-DG.



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1.4. Related Documents

- [1] AT Commands Reference Guide: 80000ST10025a
- [2] Refer to the specific “Telit Product Description” document
- [3] Refer to the specific “Telit Hardware User Guide” document
- [4] IP Easy User Guide: 80000ST10028A
- [5] ETSI GSM 07.07, 27.07
- [6] EVK2 User Guide: 1vv0300704
- [7] ETSI GSM 03.38, 23.038
- [8] Virtual Serial Device, Application Note: 80000NT10045A
- [9] Device Requirements AT&T, Document Number 13340
- [10] HE910/UE910 Family Ports Arrangements, User Guide: 1vv0300971
- [11] /
- [12] ITU-T Recommendation E.164
- [13] ETSI GSM 11.11, 51.011, 31.101, 31.102
- [14] ITU-T Recommendation V.24
- [15] UC864/CC864 Windows 2000, XP and Vista Driver: 1vv0200903.
- [16] ETSI GSM 11.14, 51.014
- [17] HE910/UE910 AT Commands Reference Guide: 80378ST10091A
- [18] /
- [19] ETSI GSM 27.005
- [20] Telit’s Easy Scan, User Guide, Telit document: 1vv0300972



2. Basic Operations

Before dealing with the description of the AT commands examples, it is advisable to define a way to point out the differences, if any, among modules belonging to different families, or having different software versions. The rules listed below will be used:

- Under *GSM/GPRS Standards* label are described AT commands examples concerning the modules supporting the GSM/GPRS standards. Where needed, software version is specified.
- Under *HSPA-GSM/GPRS Standards* label are described AT commands examples concerning the modules supporting the HSPA-GSM/GPRS standards. Where needed, software version is specified.
- If the AT command example is valid for all products, no labels are indicated.

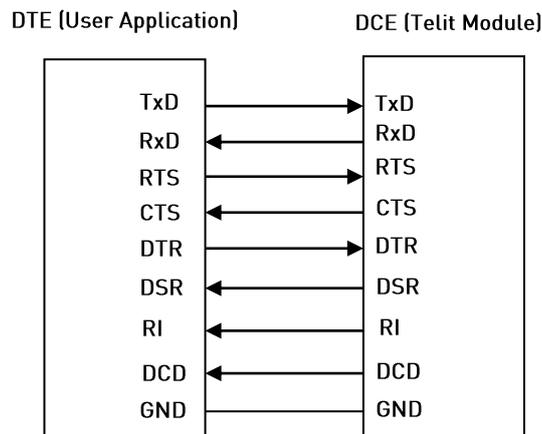


WARNING: The AT commands usage specified in this guide refer to the #SELINT=2 AT Interface Style. Refer to [1] or [17].



2.1. RTS/CTS handshaking

For reader convenience hereafter is showed the V.24 serial interface provided by the Telit Modules.



After power on, the Telit Module is ready to receive AT commands on its Main Serial Port. In general, its second serial port, called Auxiliary, is used for factory test. To have more hardware information refer to [3] in accordance with the module under test. The figures below show the RTS/CTS handshaking of the Main Serial Port:

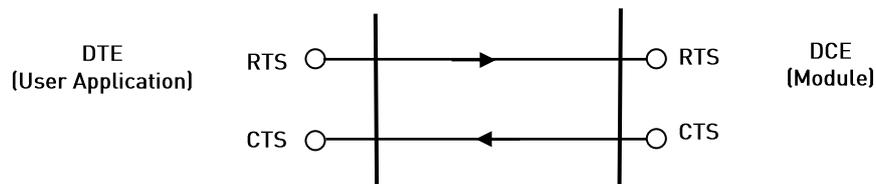


fig. 1: RTS/CTS control lines



GSM/GPRS Standards

RTS control line

The RTS control line indicates permission to the DCE (module) to send data to the DTE (user equipment). The RTS (output) of DTE is checked by the module every GSM TDMA frame (4.61 ms). As soon as the RTS of the DTE is detected as not asserted, the module immediately stops the transmission of the bytes toward the DTE.

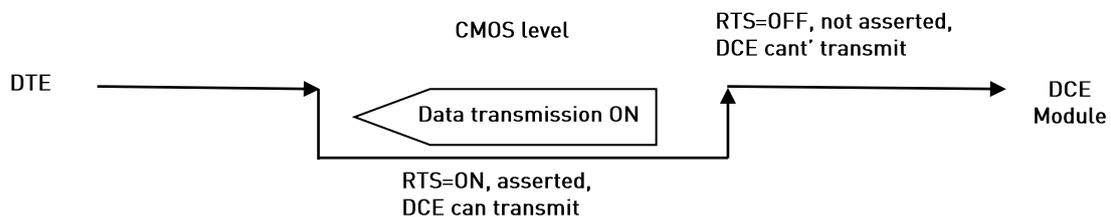


fig. 2: RTS control line

The maximum number of characters that Telit Module can send to the DTE after the transition RTS asserted to RTS NOT asserted depends upon the used serial port speed. In any case, to take into account delays due to software tasks priorities it is necessary to consider a detection interval equal to $4.61 \times 2 = 9.22$ ms.

Example:

- at 115200 8N1 the maximum number of transmitted characters (bytes) by DCE is 107:
 $115200 \text{ 8N1} \Rightarrow 115200 \text{ bit/s} = 11520 \text{ char/s} = 11.52 \text{ char/ms} = 106.2 \text{ char/GSM frame} \times 2$;
- at 57600 8N1 the maximum number of transmitted characters (bytes) by DCE is 54;
- at 9600 8N1 the maximum number of transmitted characters (bytes) by DCE is 9.



NOTE: for the GE910 products (no V3) the number of transmitted characters is formed by two quantities:

- 288 characters: the number is fixed, regardless the selected speed,
- 53 is the max number of characters that are transmitted when the software detects the RTS transition after the max interval time equal to 4.61 ms. In this example the used speed is 115200 bits/s,
- in this example, the maximum number of transmitted characters is: $288 + 53 = 341$.



HSPA-GSM/GPRS Standards

RTS control line

The RTS control line indicates permission to the DCE (module) to send data to the DTE (user equipment). The low-high RTS transition generates an interrupt signal. Between the RTS transition and the interrupt signal recognition the module can send at most one character toward DTE.



NOTE: it is supposed that the generic HE910 product is in ON line mode and the DTE forces the RTS control line to high, see fig. 2. The data flow from the module to the DTE (download) is stopped. At the same time, the CTS control line is low, see Fig. 3, it means that the module can receive data from DTE (upload). Follow the steps specified hereunder to force the module in the COMMAND mode:

- enter the escape sequence: +++
- force the RTS to low

The Tx buffer of the module will be emptied, and the OK message will be displayed. The module is again in COMMAND mode.

GSM/GPRS Standards, HSPA-GSM/GPRS Standards

CTS control line

The CTS control line indicates permission to the DTE (user equipment) to send data to the DCE (module). The CTS (output) of the DCE is not asserted when the data in its receiver buffer is greater than 75% of its capacity, the DTE transmission is stopped. The CTS is asserted when data in the receiver buffer of the module is lower than 25% of its capacity, the DTE transmission starts again.

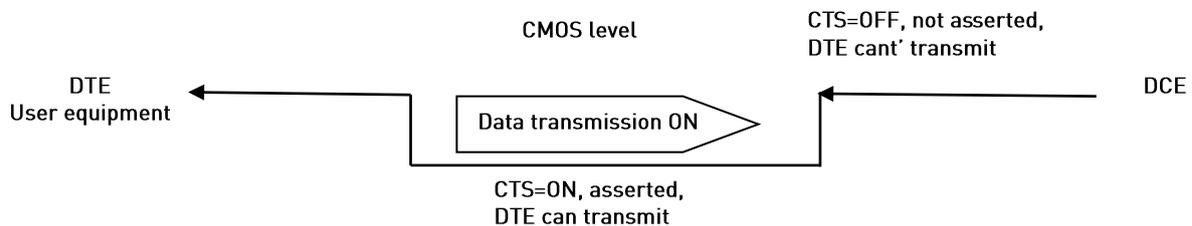


Fig. 3: CTS control line



2.4. Enable Extended Error Result codes

Disable the Error Report in numerical and verbose format:

AT+CMEE=0
OK

Enable the Error Report in numerical format:

AT+CMEE=1
OK

Enable the Error Report in verbose format:

AT+CMEE=2
OK

2.5. Main Serial Port Speed Configuration

Standards (Refer to Applicability Table)	Software Version equal/higher than:	Main Serial Port Speed Configuration
GSM/GPRS	10.00.xx5, 16.00.xx2	Autobauding
GSM/GPRS	13.00.xx4	No autobauding, use 115200 bit/sec
HSPA-GSM/GPRS	12.00.xx.4	No autobauding, use 115200 bit/sec

GSM/GPRS Standards

Use the following AT command to specify the Main Serial Port speed:

AT+IPR=<rate>

Examples

Check the current Main Serial Port speed (factory setting: autobauding = 0):

AT+IPR?
+IPR: 0
OK

Check the Main Serial Port speed range:



Software versions: 10.xx.xxx, 16.xx.xxx

AT+IPR=?

+IPR:

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

OK

Software version 13.xx.xxx

AT+IPR=?

+IPR: (300,1200,2400,4800,9600,19200,38400,57600,115200,230400,460800,921600)

OK

Set up the Main Serial Port speed to 38400 bps:

AT+IPR=38400

OK

Before entering the following AT commands set up the DTE serial port speed to 38400 bps

AT&W0

← store the setting on profile 0

OK

AT&P0

← at power on use profile 0

OK

Check the current Main Serial Port speed.

AT+IPR?

+IPR: 38400

OK



2.6. Auxiliary Serial Port Arrangement

GSM/GPRS Standards

Use the following AT command to connect/disconnect the Auxiliary Serial Port to/from one of the three Services:

- AT1 Parser (Instance # 2)
- AT2 Parser (Instance # 3)
- Trace Service

AT#SII = <inst>

Examples

AT#SII?

#SII: 0 ← the Auxiliary Serial Port is connected to Trace Service; see the table below
OK

AT#SII=1 ← Auxiliary Serial Port is disconnected from Trace Service and connected to AT1
OK parser. Main Serial Port is still connected to AT0 Parser as showed on the table.

Power on / AT#SII	AT0	AT1	AT2	Trace Service
	Instance #1	Instance #2	Instance #3	
Power on	Main Serial Port	X	X	Aux. Serial Port
AT#SII=1	Main Serial Port	Aux. Serial Port	X	X
AT#SII=2	Main Serial Port	X	Aux. Serial Port	X
AT#SII=0	Main Serial Port	X	X	Aux. Serial Port

Refer to [3], in accordance with the module under test, to know detailed information concerning the Main Serial Port and Auxiliary Serial Port provided by Telit Modules .



2.7. Select Cellular Network

GSM/GPRS Standards

The following AT command selects the Cellular Network: the only valid value is 12. It selects the single supported technology: GSM digital cellular (GERAN):

```
AT+WS46=12  
OK
```

HSPA-GSM/GPRS Standards

The following AT command selects the Cellular Network:

```
AT+WS46=[<n>]
```

Examples

Select GSM digital cellular (GERAN)

```
AT+WS46=12  
OK
```

Select UTRAN only

```
AT+WS46=22  
OK
```

Select 3GPP System (both GERAN and UTRAN)

```
AT+WS46=25  
OK
```



NOTE: the <n> parameter is stored on NVM and the command will take effect on the next power on. If on the air are present both technologies GERAN and UTRAN, the second one is preferred.



2.8. Band Configuration

GSM/GPRS Standards

The following AT command enables the automatic band selection:

```
AT#AUTOBND=2  
OK
```

The following AT command disables the automatic band selection (manual band selection):

```
AT#AUTOBND=0  
OK
```

In manual band selection the following AT command selects the current band:

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

Examples

```
AT#BND=0          ← selected band: GSM 900MHz + DCS 1800MHz  
OK
```

HSPA-GSM/GPRS Standards

The following AT command enables the automatic band selection:

```
AT#AUTOBND=2  
OK
```

The following AT command disables the automatic band selection (manual band selection):

```
AT#AUTOBND=0  
OK
```

In manual band selection the following AT command selects the current band for both technologies GERAN and UTRAN:

```
AT#BND=[<band>][,<UMTS band>]
```

Examples

```
AT#BND=0,0        ← selected band: GSM 900MHz + DCS 1800MHz 2100 MHz (FDD I)  
OK
```





NOTE: the module uses a band out of the two entered with the previous command. The selected band will be in accordance with the +WS46 command and the technologies available on the air.

Check the bands supported by the module

```
AT#BND=?  
#BND: (0-3),(0-6)  
OK
```

2.9. Software Shutdown

Enter the following AT command:

```
AT#SHDN  
OK
```

During shutdown the module executes the following actions:

- Detachment from the network
- Module Power off

To get more information about procedure and timing refer to [3] in accordance with the module under test.



2.10. SIM

2.10.1. SIM Presence and PIN Request

The following AT command checks if the SIM device needs the PIN code:

AT+CPIN?

Examples

Assume that the SIM is inserted into the module and the PIN code is needed.

AT+CPIN?

+CPIN: SIM PIN

OK

Assume that the SIM is not inserted and Extended Error result code is not enabled. Check if PIN code is needed, just to see the response command:

AT+CPIN?

ERROR

Assume that the SIM is not inserted and Verbose Extended error result code is enabled. Check if PIN code is needed, just to see the response command:

AT+CPIN?

+CME ERROR: SIM not inserted

Assume that the SIM is not inserted and Numerical Extended error result code is enabled. Check if PIN code is needed, just to see the response command:

AT+CPIN?

+CME ERROR: 10

2.10.2. Enter PIN code

Use the following AT command to enter the PIN code:

AT+CPIN=<pin>

Examples



Assume to enter a wrong PIN code, and Extended Error result is not enabled.

AT+CPIN=1235
ERROR

Now, enter the right PIN code:

AT+CPIN=1234
OK

Enable Verbose Extended error result code:

AT+CMEE=2
OK

Enter a wrong PIN code:

AT+CPIN=1235
+CME ERROR: incorrect password.



NOTE: after 3 PIN code failed attempts, the PIN code is no longer requested and the SIM is locked. Use SIM PUK to enter a new PIN code and unlock the SIM.

2.10.3. Enter PUK code

Enter the following AT command if PUK or PUK2 code is required:

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



NOTE: after 10 PUK code failed attempts, the SIM Card is locked and no longer available.

2.10.4. SIM Status

Use the following AT command to enable/disable the SIM Status Unsolicited Indication.

AT#QSS = <mode>

Example 1

Enable the unsolicited indication concerning the SIM status change.

AT#QSS=1 ← enable URCs: #QSS:0/1
OK

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



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

Example 2

AT#QSS=2 ← enable URCs: #QSS:0/1/2/3
OK

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

AT&W0 ← store the setting on profile 0
OK

AT&P0 ← at Power on use profile 0
OK

Now, power off the module:

#QSS:1 ← unsolicited indication: SIM inserted

Now, power on the module:

#QSS:1 ← unsolicited indication: SIM inserted

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

AT+CPIN=<PIN> ← enter PIN
OK

#QSS: 2 ← unsolicited indication: SIM is unlocked

#QSS: 3 ← unsolicited indication: SMS and Phonebook are accessible



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



AT#SIMDET?
#SIMDET: 1,0 ← 1 = simulate the status SIM inserted, 0 = SIM is physically not inserted
OK

Now, insert/extract the SIM, no unsolicited indication appears on DTE!

Extract the SIM and set automatic SIM detection

AT#SIMDET=2
OK

AT#SIMDET?
#SIMDET: 2,0 ← 2 = automatic SIM detection through SIMIN pin (Factory Setting),
OK 0 = SIM not inserted

Now, insert/extract the SIM, unsolicited indication appears again on DTE!

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

#QSS: 0 ← unsolicited indication: SIM is physically extracted

2.10.6. SIM/USIM Access File

SIM and USIM devices are accessible using two different protocols. A generic device can support one or both protocols. Telit Modules, in accordance with the installed software version, can access only SIM or both SIM/USIM cards; refer to the table showed below:

Standards (Refer to Application Table)	Software Version equal/higher than:	Cards supported	Support mode
GSM/GPRS	10.00.xx5, 13.00.xx4, 16.00.xx2	SIM/USIM	AT#ENASIM ²
HSPA-GSM/GPRS	12.00.xx.4	SIM/USIM	Automatic detection: if the used card provides both protocols, the module selects the USIM protocol (it is the preferred).

Tab. 1: SIM/USIM

² AT#ENASIM=0 enables SIM protocol (factory setting) , AT#ENASIM=1 enables USIM protocol.



2.10.8. Preferred Operator List

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

GSM/GPRS Standards

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

Examples

Check the supported number of operators in the SIM Preferred Operator List and the format:

AT+CPOL=?

+CPOL: (1-20),(2) ← The used SIM supports 20 positions; the supported format (2) is numeric
OK

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

The meaning of the string "XXXYY" is: - XXX = Mobile Country Code

- YY = Mobile Network Code

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

AT+CPOL=1,3

+CME ERROR: operation not supported

Now, delete the first entry using the right <format> value:

AT+CPOL=1,2

OK

Check if the first entry is deleted:



AT+CPOL?

```
+CPOL: 2,2,"20810"
+CPOL: 3,2,"23205"
.
+CPOL: 19,2,"23802"
+CPOL: 20,2,"24201"
OK
```

The entry on first position is deleted

AT+CPOL=1,2,20801 ← Write a new entry in the first position
OK

Check if the new entry is written on first position:

```
AT+CPOL?
+CPOL: 1,2,"20801" ← The new entry is written on first position
+CPOL: 2,2,"20810"
.
+CPOL: 20,2,"24201"
OK
```

HSPA-GSM/GPRS Standards

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

Examples

Check the supported number of operators in the SIM preferred operator list and the format:

AT+CPOL=?
+CPOL: (1-35),(2) ← The used SIM supports 35 positions; the supported format (2) is numeric
OK

```
AT+CPOL?
+CPOL: 1,2,"20801",1,0,1
+CPOL: 2,2,"21407",1,0,1
.
+CPOL: 35,2,"73001",1,0,1
OK
```



2.11. Network Information

2.11.1. Network Status

Enter the following AT command to verify if the module is registered on a Network:

AT+CREG?

GSM/GPRS Standards

Examples:

```
AT+CREG?           ← Check if the module is registered
+CREG: 0,1        ← Yes, it is.
OK
```

Now, disconnect the antenna from the module and enter again the command:

```
AT+CREG?
+CREG: 0,3
OK
```

Connect again the antenna to the module and select the Network Registration Report format: Local Area Code and Cell Id:

```
AT+CREG=2
OK
```

```
AT+CREG?
+CREG: 2,1,55FA,12EB
OK
```

Now, enter a wrong parameter just to see the result format when Verbose Extended Error result is enabled:

```
AT+CREG=9
+CME ERROR: operation not supported
```

HSPA-GSM/GPRS Standards

Let's suppose that GERAN and UTRAN technologies are present on the air.

Example

Force the module in GSM/GPRS mode.

```
AT+WS46=12
OK
```

Select the Network Registration Report format: Local Area Code and Cell Id:



AT+CREG=2
OK

AT+CREG?
+CREG: 2,1,"D5BD",,"520F",0
OK

Example

Use the command AT+WS46=22 or AT+WS46=25 to force the module in HSPA mode.

AT+WS46=25
OK

Select the Network Registration Report format: Local Area Code and Cell Id:

AT+CREG=2
OK

AT+CREG?
+CREG: 2,1,"EF8D",,"52D2388",2
OK

2.11.2. Network Operator Identification

Use the following AT command to query the mobile for Network Operators Identifications Codes and Names:

AT+COPS=?

GSM/GPRS Standards

Examples

Assume that the module is registered on some Network:

AT+COPS=?
+COPS: (2,"I WIND",,"22288"),(3," hest ne IT",,"22210"),(1,"SI.MOBIL",,"29340"),(0-4),(0,2)
OK

Now, disconnect the antenna and assume that Verbose Extended Error result is enabled. Enter again the previous AT command:

AT+COPS=?
+CME ERROR: no network service



HSPA-GSM/GPRS Standards

Let's suppose that GERAN and UTRAN technologies are present on the air.

Example

Force the module in GSM/GPRS mode.

AT+WS46=12
OK

Check if the module is in GSM/GPRS mode

AT+COPS?
+COPS: 0,0,"I TIM",0
OK

Yes, it is.

Collect information about GERAN Networks:

AT+COPS=?
+COPS: (2,"I TIM",,"22201",0),(1,"SI MOBITELE GSM",,"29341",0),(3,"I WIND",,"22288",0),(3," hest ne IT",,"22210",0),(1,"SI VEGA 070",,"29370",0),(1,"SI MOBIL",,"29340",0),,(0-4),(0,2)
OK

Example

Use the command AT+WS46=22 or AT+WS46=25 to force the module in HSPA mode.

AT+WS46=25
OK

Check if the module is in HSPA mode

AT+COPS?
+COPS: 0,0,"I TIM",2
OK

Yes, it is.

Collect information about UTRAN and GERAN Networks:

AT+COPS=?
+COPS: (2,"I TIM",,"22201",2),(2,"I TIM",,"22201",0),(1,"SI MOBITELE GSM",,"29341",0),(3,"I WIND",,"22288",2),(1,"SI MOBIL",,"29340",0),(1,"3 ITA",,"22299",2),(3," hest ne IT",,"22210",2),(3,"I WIND",,"22288",0),(3," hest ne IT",,"22210",0),(1,"SI VEGA 070",,"29370",0),,(0-4),(0,2)
OK



2.11.3. Signal Strength & Quality

Assume that the mobile is registered on a Network that can be: GERAN or UTRAN. The following AT command can be useful to know the received signal strength & quality to have an indication about the radio link reliability.

AT+CSQ

Examples

Assume that the antenna is not connected to the Telit Module or Network coverage is not present at all.

AT+CSQ
+CSQ: 99,99
OK

Now, the antenna is connected to the Telit Module and Network coverage is present. Enter again the previous AT command:

AT+CSQ
+CSQ: 17,0
OK

17 = <rssI> = Received Signal Strength Indication

0 = <ber> = Bit Error Rate

Now, 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

2.11.4. Fast Network Status Check

Once the Telit Module is registered on a Network, doesn't matter about the technology (GERAN or UTRAN), it could be useful to know the received signal strength and the Network on which the Telit Module is registered. This information can be gathered by means of the following standard AT commands: +CREG, +COPS and +CSQ. These commands are not fast in the response due to Network response time, especially the +COPS command.

If the User objective is to keep its Software Application as general as possible, he can use the standard AT commands above mentioned and described on the previous paragraphs.

In addition, Telit Modules provide the user with proprietary AT commands to gather all the information needed in a faster and simpler way, they are:



- #MONI
- #SERVINFO

Use the following AT command to select cells and collect their information:

AT#MONI=[<number>]]

GSM/GPRS Standards

The following examples are valid also for *HSPA-GSM/GPRS Standards* when the module is forced in GSM mode by means of the command AT+WS46=12.

Examples

Assume that the antenna is connected to the module and only serving cell information is needed.

Check if the module is using GSM/GPRS standard:

AT+COPS?
+COPS: 0,0,"I TIM",0
OK

Yes, it is using GSM standard. The last parameter displayed by the command response is reported only by the *HSPA-GSM/GPRS Standards*, it gives information concerning access technology.

Select the Serving Cell:

AT#MONI=0
OK

Collect information:

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

The module is registered on "I WIND" Network, the signal strength is -75dBm.

Now, disconnect the antenna from the module and trying to collect cell information just to see the format response:

AT#MONI
ERROR
OK



The antenna is again connected to the module and Serving Cell and Neighboring Cells information is needed.

Select all available cells:

AT#MONI=7
OK

Collect information:

AT#MONI

#MONI:	Cell	BSIC	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

HSPA-GSM/GPRS Standards

Let's suppose that the UTRAN technology is present on the air. Use the command AT+WS46=22 or AT+WS46=25 to force the module in HSPA mode.

Examples

Check if the module is using HSPA standard:

AT+COPS?
+COPS: 0,0,"I TIM",2
OK

Yes, it is using HPSA standard.

Select the Serving Cell:

AT#MONI=0
OK

Collect information:

AT#MONI

#MONI: I TIM PSC:49 RSCP:-102 LAC:EF8D Id:52D2388 EcIo:-2.5 UARFCN:10638 PWR:-97 dbm DRX:64 SCR:784

OK



Use the following AT command to collect only the Serving Cell Information:

AT#SERVINFO

This Modules Family provides also this command to get the current network status:

AT#RFSTS

```
#RFSTS: "222 01",10638,49,-5.0,-95,-85,EF8D,00,-128,128,19,4,2,,52D2388,"2220170
02413217","I TIM",3,0
OK
```

GSM/GPRS Standards

The following examples are valid also for *HSPA-GSM/GPRS Standards* when the module is forced in GSM mode by means of the command AT+WS46=12.

Examples

Collect only the Serving Cell Network Information:

AT#SERVINFO

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

HSPA-GSM/GPRS Standards

Let's suppose that the UTRAN technology is present on the air. Use the command AT+WS46=22 or AT+WS46=25 to force the module in HSPA mode.

Examples

Collect only the Serving Cell Network Information:

AT#SERVINFO

```
#SERVINFO: 10638,-94,"I TIM","22201",49,EF8D,64,3,-101,"II",00
OK
```



NOTE: #MONI and #SERVINFO commands should be used only to collect Network Name and Signal Strength information. To check if mobile is registered or is looking for a suitable network to register on, use +CREG command. In fact, if the network signal is too weak and mobile loses the registration, until a new network is found the two commands report the last measured valid values and not the real ones. The TA (timing advance parameter) is valid only during a call.



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

2.11.5. Network Survey

Use the following AT command to perform a quick survey though channels belonging to the current band (it is not supported by *HSPA-GSM/GPRS Standards*), refer to [20]:

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

Examples

AT#BND?

#BND: 0

OK

AT#CSURV=4,8

Network survey started ...

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

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

arfcn: 8 rxLev: -92

arfcn: 6 rxLev: -93

arfcn: 5 rxLev: -98

Network survey ended

OK

2.11.6. BCCH Survey

Use the following AT command to perform a quick survey of the channels belonging to the current band. The survey stops as soon as <n> BCCH carriers are found. It is not supported by *HSPA-GSM/GPRS Standards*.

AT#CSURVB = [<n>]

Examples

AT#CSURVB=2



2.11.7.1. Software Versions: higher than or equal 10.00.xx5/16.00.xx2

Configuration 1: module with no AT&T SIM cards

Assume that #ENS is set to 1. The module supports:

- EONS features (refer to [9], § 15)
- ENS features for Network selection (refer to [9], §13)
- special requirements for USSD strings (refer to [9], <CDR-GSM-255>)
- special ATD dial string format (ATDxxxxxPyyyyyy), refer to [9] <CDR-CON-3074>, <CDR-CON-3342>;
- **10.00.xx5**: if #AUTOBND=0 then, automatically, #AUTOBND is forced to 1. If #AUTOBND=2 (factory setting) no action is taken.
- **>= 10.00.xx6/16.00.xx2**: if #AUTOBND=0 then, automatically, #AUTOBND is forced to 2. If #AUTOBND=2 (factory setting) no action is taken.
- +PACSP AT command to display the PLMN Mode Bit read from CPHS file on SIM (refer to [9])
- AT#STIA=2,1 as default
- the max length of the telephone number that can be stored in SIM phonebooks is greater than the default value (20)
- AT#PLMNMODE=1 as default
- different coding and encoding for MCC and MNC for SAT functions (refer to [9])
- MWI messages (refer to [9], §16)

Configuration 2: module with an AT&T SIM card

Assume that #ENS is set to 1. The module supports the features indicated in *Configuration 1*, plus the following:

- Acting Home PLMN (refer to [9], § 12)

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



Regardless the SIM card used, the module supports the following features in accordance with the #ENS setting:

- Concerning Phonebook string management:

	BCD format	conversion	ASCII format
#ENS=1	0x0D (wild char)	→	?
	?	←	0x0D (wild char)
	0x0C	←	P
	0x0C	←	p

	BCD format	conversion	ASCII format
#ENS=0	0x0D (wild char)	→	@
	@	←	0x0D (wild char)
	0x0C	←	P

- #ENS=1: USSD MT event is notified via the tone associated to an SMS MT. If #ENS=0, the event is not notified via the tone, but is notified via an unsolicited message (if it is enabled).
- #ENS=1: the default GSM band parameter of #BND AT command is 3. If #ENS=0, the default GSM band parameter is 0.
- #ENS=1: #BND=1 or #BND=2 are not permitted. If #ENS=0, they are permitted.
- #ENS=1: ATD 0; and ATD 00; AT commands execute a call to the phone number 0 and 00 respectively. If #ENS=0, 0 and 00 are interpreted as USSD strings and sent to the network.
- #ENS=1: enter AT+CLCK="FD",1,PIN2 AT command to select the FD phonebook as current phonebook. If #ENS=0, enter the following commands:

```
AT+CPBS="FD"
ERROR
```

```
AT+CPIN=PIN2
OK
```

```
AT+CPBS="FD"
OK
```

In alternative of the three above listed AT commands the following one can be used:



AT+CLCK="FD",1,PIN2

- #ENS=1: after activating the context via AT+CGACT=1,<cid> AT commands, the DNS information is not received. Enter ATD*99***1# to execute the dial up. If #ENS=0, after activating the context via AT+CGACT=1,<cid> AT commands, the DNS information is received. Enter ATD*99***1# to execute the dial up.

2.11.7.2. Software Version: higher than or equal 13.00.xx2

Configuration 1: module with no AT&T SIM cards

The module supports the following features independently from the #ENS setting:

- EONS features (refer to [9], § 15)
- special requirements for USSD strings (refer to [9], <CDR-GSM-255>)
- special ATD dial string format (ATDxxxxxPyyyyyy), refer to [9] <CDR-CON-3074>, <CDR-CON-3342>;
- +PACSP AT command to display the PLMN Mode Bit read from CPHS file on SIM (refer to [9])
- the max length of the telephone number that can be stored in SIM phonebooks is greater than the default value (20)

The module supports the following features when #ENS is set to 1:

- If #AUTOBND=0 then, automatically, #AUTOBND is forced to 2. If #AUTOBND=2 (factory setting) no action is taken.
- AT#BND supports only values 0 and 3
- AT#STIA=2,1 as default
- different coding and encoding for MCC and MNC for SAT functions (refer to [9])
- MWI messages (refer to [9], §16)
- ENS features for Network selection (refer to [9], §13)
- AT#PLMNMODE=1 as default

Configuration 2: module with an AT&T SIM card

Assume that #ENS is set to 1. The module supports the features indicated in **Configuration 1**, plus the following:



after activating the context via AT+CGACT=1,<cid> commands, the DNS information is received. Enter ATD*99***1# to execute the dial up

2.11.7.3. Software Version: 12.00.xx2

Configuration 1: module with no AT&T SIM cards

Assume that #ENS is set to 1. The module supports:

- EONS features (refer to [9], § 15)
- special requirements for USSD strings (refer to [9], <CDR-GSM-255>)
- special ATD dial string format (ATDxxxxxPyyyyy), refer to [9] <CDR-CON-3074>, <CDR-CON-3342>;
- If #AUTOBND=0 then, automatically, #AUTOBND is forced to 2. If #AUTOBND=2 (factory setting) no action is taken.
- AT#BND supports only values 0 and 3, no restriction on second parameter
- +PACSP AT command to display the PLMN Mode Bit read from CPHS file on SIM (refer to [9])
- AT#STIA=2,1 as default
- the max length of the telephone number that can be stored in SIM phonebooks is greater than the default value (20)
- different coding and encoding for MCC and MNC for SAT functions (refer to [9])
- MWI messages (refer to [9], §16)

Configuration 2: module with an AT&T SIM card

Assume that #ENS is set to 1. The module supports the features indicated in *Configuration 1*, plus the following:

- Acting Home PLMN (refer to [9], § 12)

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)

Regardless the SIM card used, the module supports the following features in accordance with the #ENS setting:



- Concerning Phonebook string management:

	BCD format	conversion	ASCII format
#ENS=1	0x0D (wild char)	→	?
	?	←	0x0D (wild char)
	0x0C	←	P
	0x0C	←	p

	BCD format	conversion	ASCII format
#ENS=0	0x0D (wild char)	→	@
	@	←	0x0D (wild char)
	0x0C	←	P

- #ENS=1: USSD MT event is notified via the tone associated to an SMS MT. If #ENS=0 the event is not notified via the tone, but is notified via an unsolicited message (if it is enabled).
- #ENS=1: the default GSM band parameter of #BND AT command is 3. If #ENS=0, the default GSM band parameter is 0.
- #ENS=1: #BND=1 or #BND=2 are not permitted. If #ENS=0, they are permitted.
- #ENS=1: ATD 0; and ATD 00; AT commands execute a call to the phone number 0 and 00 respectively. If #ENS=0, 0 and 00 are interpreted as USSD strings and sent to the network.
- #ENS=1: after activating the context via AT+CGACT=1,<cid> commands, the DNS information is not received. Enter ATD*99***1# to execute the dial up. If #ENS=0, after activating the context via AT+CGACT=1,<cid> commands, the DNS information is received. Enter ATD*99***1# to execute the dial up

2.11.7.4. Software Version: higher than or equal 12.00.xx3

Configuration 1: module with no AT&T SIM cards

The module supports the following features independently from the #ENS setting:

- EONS features (refer to [9], § 15)



- special requirements for USSD strings (refer to [9], <CDR-GSM-255>
- special ATD dial string format (ATDxxxxxPyyyyy), refer to [9] <CDR-CON-3074>, <CDR-CON-3342>;
- +PACSP AT command to display the PLMN Mode Bit read from CPHS file on SIM (refer to [9])
- the max length of the telephone number that can be stored in SIM phonebooks is greater than the default value (20)

The module supports the following features when #ENS is set to 1:

- If #AUTOBND=0 then, automatically, #AUTOBND is forced to 2. If #AUTOBND=2 (factory setting) no action is taken.
- AT#BND supports only values 0 and 3, no restriction on second parameter
- AT#STIA=2,1 as default
- different coding and encoding for MCC and MNC for SAT functions (refer to [9])
- MWI messages (refer to [9], §16)

Configuration 2: module with an AT&T SIM card

Assume that #ENS is set to 1. The module supports the features indicated in *Configuration 1*, plus the following:

- Acting Home PLMN (refer to [9], § 12)

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)

Regardless the SIM card used, the module supports the following features in accordance with the #ENS setting:

- Concerning Phonebook string management:

	BCD format	conversion	ASCII format
#ENS=1	0x0D (wild char)	→	?
	?	←	0x0D (wild char)
	0x0C	←	P



	0x0C	←	p
--	------	---	---

	BCD format	conversion	ASCII format
#ENS=0	0x0D (wild char)	→	@
	@	←	0x0D (wild char)
	0x0C	←	P

- #ENS=1: USSD MT event is notified via the tone associated to an SMS MT. If #ENS=0, the event is not notified via the tone, but is notified via an unsolicited message (if it is enabled).
- #ENS=1: the default GSM band parameter of #BND AT command is 3. If #ENS=0, the default GSM band parameter is 0.
- #ENS=1: #BND=1 or #BND=2 are not permitted. If #ENS=0, they are permitted.
- #ENS=1: ATD 0; and ATD 00; AT commands execute a call to the phone number 0 and 00 respectively. If #ENS=0, 0 and 00 are interpreted as USSD strings and sent to the network.
- #ENS=1: AT+CFUN=0 is the same of AT+CFUN=4. If #ENS=0, +CFUN=0 and +CFUN=4 have the standard behavior.
- #ENS=1: the Radio Policy Management (RPM) is supported. If #ENS=0, RPM is not supported.
- #ENS=1: the default class parameter is 12 (AT#MSCLASS=12). If #ENS=0, the default class parameter is 33.
- #ENS=1: the following CPC features are disabled:
 - HSPA and HSPA+ 7.4 HSPA+ <CDR-HSD-491> UL DPCCCH Gating (Uplink DTX)
 - HSPA and HSPA+ 7.4 HSPA+ <CDR-HSD-492> E-DCH Tx Start Timer Restriction (Uplink DRX)
 - HSPA and HSPA+ 7.4 HSPA+ <CDR-HSD-493> Downlink DRX
 - HSPA and HSPA+ 7.4 HSPA+ <CDR-HSD-494> New UL DPCCCH Slot Format
 - HSPA and HSPA+ 7.4 HSPA+ <CDR-HSD-496> CQI Reporting Reduction

If #ENS=0, the features are enabled.



- #ENS=1: after power on the module executes the SIM reading and the network registration in sequential way. The call establishment is immediately available after the network registration. If #ENS=0, the module executes the SIM reading and the network registration in parallel. It can happen that the module is registered, but the reading SIM is not ended, for this reason wait for some seconds after network registration before calling.
- #ENS=1: after activating the context via AT+CGACT=1,<cid> commands, the DNS information is not received. Enter ATD*99***1# to execute the dial up. If #ENS=0, after activating the context via AT+CGACT=1,<cid> commands, the DNS information is received. Enter ATD*99***1# to execute the dial up



2.12.3. Set Volume on Speaker

Use the following AT command to set up the output volume level on the active audio path:

```
AT+CLVL=<vol>  
OK
```

If the used module provides two audio paths (HS and HF), when moving from one path to the new one, the volume level does not change.

2.12.4. Set Microphone Mute

The microphone of the active path can be muted with the following AT command:

```
AT+CMUT=1  
OK
```

Check the microphone mute setting:

```
AT+CMUT?  
+CMUT: 1  
OK
```



Enable sidetone

AT#SHSSD=1
OK

2.12.5.3. HS Echo Canceller

Use the following AT command to enable/disable the echo canceller function on HS audio path.

AT#SHSEC=<mode>

Examples

Check the available values

AT#SHSEC =?
#SHSEC: (0-1)
OK

Check the current value

AT#SHSEC?
#SHSEC: 0
OK

Enable echo canceller function

AT#SHSEC=1
OK

2.12.5.4. HS Automatic Gain

Use the following AT command to enable/disable the automatic gain control function on HS audio path.

AT#SHSAGC=<mode>

Examples

Check the available values

AT#SHSAGC =?
#SHSAGC: (0-1)
OK

Check the current value



2.12.6.2. HF Sidetone

Use the following AT command to enable/disable the sidetone on HF audio path.

AT#SHFSD=<mode>

Examples

Check the available values

AT#SHFSD =?

#SHFSD: (0-1)

OK

Check the current value

AT#SHFSD?

#SHFSD: 0

OK

Enable sidetone

AT#SHFSD=1

OK

2.12.6.3. HF Echo Canceller

Use the following AT command to enable/disable the echo canceller function on HF audio path.

AT#SHFEC=<mode>

Examples

Check the available values

AT#SHFEC =?

#SHFEC: (0-1)

OK

Check the current value

AT#SHFEC?

#SHFEC: 0

OK

Enable echo canceller function

AT#SHFEC=1

OK



2.12.6.4. HF Automatic Gain

Use the following AT command to enable/disable the automatic gain control function on HF audio path.

AT#SHFAGC=<mode>

Examples

Check the available values

AT# SHFAGC =?
#SHFAGC: (0-1)
OK

Check the current value

AT# SHFAGC?
SHFAGC: 0
OK

Enable automatic gain control function

AT# SHFAGC =1
OK

2.12.6.5. HF Noise Reduction

Use the following AT command to enable/disable the noise reduction function on HF audio path.

AT#SHFNRR=<mode>

Examples

Check the available values

AT# SHFNRR =?
#SHFNRR: (0-1)
OK

Check the current value

AT# SHFNRR?
SHFNRR: 0
OK

Enable the noise reduction function

AT# SHFNRR =1
OK



2.12.9. Setting Audio Codec

This example is valid for both Standards: **GSM/GPRS** and **HSPA-GSM/GPRS**. Even if the mobile is registered on UTRAN network, usually the Operator assigns to the mobile a GSM channel to carry on a voice call. Use the following AT command to select a codec during a call.

AT#CODEC = <codec>
OK

Example

AT#CODEC?
#CODEC: 0 ← all the codec are enabled
OK

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

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

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

AT#CODEC=1 ← select FR mode
OK

ATD<phone number>; ← establish the call
#CODECINFO: "FR", "FR"
OK

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

2.12.10. Disconnect a Call

Use the following AT command to hang up the current Voice Call:

ATH
OK



2.12.11. Modules: HE910-D/DG/EUD/EUG/NAD

These modules don't feature the capability to manage Mobile Originated and Mobile Terminated Voice calls, they provide Data only.

ATD<phone number>; ← the voice call is not supported
NO CARRIER

ATA ← answer to an incoming call is not supported
ERROR

ATS0=<number of rings> ← the command is supported, but it doesn't work for OK
OK the incoming voice calls: the automatic answer is not performed.

The URC RING: even though the incoming voice call is not supported, when one is active the RING message is displayed on the DTE. The RING message persists until the call is active. Remember that: the ATA command is not available and ATS0 command doesn't work with the incoming voice call. Use the ATH command to drop down the call.

2.13. CSD Data Call Establishing – Originate

Before setting up the CSD Data Call (not GPRS), it is assumed that Telit Module is registered on a network and the signal strength is enough to carry on a reliable radio link.

2.13.1. Set Module in Data Mode

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

AT+FCLASS=0
OK



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



2.13.3. Dialing a Phone Number

Use the following AT command to dial a phone number:

ATD<number>

Examples

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

ATD0404X92XYX
CONNECT 9600

Call 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



The ATD response is returned when the modem handshake is over; it takes an interval of time depending from several factors (Network Operator, communication speed, etc.). Wait for this time before doing anything: when the module is doing the handshake, entering any character closes the handshake and aborts the call.

2.13.4. Exit Data Mode and Enter Command Mode

Assume that a CSD Data Call is in progress: to exit the Data Mode, do the following actions:

1. Enter the Escape Sequence: +++
2. Wait for the Escape Sequence pause time (see **ATS12** command, refer to [1]).
3. Wait for the response OK.



NOTE: only Data and Escape Sequence are accepted during the call, all other commands are discarded. Use Escape Sequence to exit Data Mode and enter Command Mode. No characters must be entered between two consecutive “+” characters forming the Escape Sequence.

2.13.5. Disconnect Data Call

Use the following AT command to hang up the current data connection:

ATH
NO CARRIER





NOTE: during the data call the module is in Data Mode (ON LINE) and if any AT command is entered, it is discarded and not executed. Before entering the ATH command to close the call, the Escape Sequence (+++) must be used.

2.14. Answering an Incoming Call

When an Incoming Call is recognized, the module sends an Unsolicited Code to DTE. Use the following AT command to answer to the call:

ATA

2.15. GSM Single Numbering Scheme

GSM/GPRS Standard

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

AT+CSNS=<mode>

Example 1

AT+CSNS=0 ← voice (factory default)

OK

RING

RING

ATA

voice channel is ON

Example 2

AT+CSNS=2 ← data

OK

RING

RING

ATA

data channel is ON



AT# TTY? ← Check the current value
TTY: 0
OK

AT# TTY =1 ← Enable TTY functionality
OK

Now, the Voice Call is able to support jointly voice and TTY data.



3. Advanced Operations

3.1. Access to the Phonebook

The user can access, by means of dedicated AT commands, the Phonebooks stored on the SIM card or on the module itself (NVM).

The Telit Modules support the following Phonebooks:

GSM/GPRS Standards

- **“SM” – SIM Phonebook:** is used to store and recall phone numbers.
- **“FD” – SIM Fixed Dialing-Phonebook:** it is accessible by means of the PIN2 code. E.g.: if the “FD” storage holds the following string numbers: 0432, 040, the module can calls only phone numbers starting with one of the two string numbers.
- **“LD” – SIM/NVM Last-Dialing-Phonebook:** is the list of the last dialed phone numbers, it is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“MC” – NVM Missed-Calls-Phonebook:** is the list of the received calls not answered. It is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“RC” – NVM Received-Calls- Phonebook:** is the list of the received and answered calls. It is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“MB” – SIM Mail-Box- Phonebook:** is a read only list of the phone mailbox numbers. The MB must be supported by SIM.



HSPA-GSM/GPRS Standards

- **“SM” – SIM Phonebook:** is used to store and recall phone numbers.
- **“FD” – SIM Fixed Dialing-Phonebook:** It is accessible by means of the PIN2 code. E.g.: if the “FD” storage holds the following string numbers: 0432, 040, the module can call only phone numbers starting with one of the two string numbers.
- **“LD” – SIM Last-Dialing-Phonebook:** is the list of the last dialed phone numbers; it is updated automatically in SIM. +CPBW command can be only used to delete phone numbers.
- **“MC” – NVM Missed-Calls-Phonebook:** is the list of the received calls not answered. It is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“RC” – NVM Received-Calls-List:** is the list of the received and answered calls. It is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“MB” – SIM Mail-Box-List:** is a read only list of the phone mailbox numbers. The MB must be supported by SIM.
- **“DC” – NVM Last-Dialing-Phonebook:** is the list of the last dialed phone numbers stored on the module (NVM); it is updated automatically. +CPBW command can be only used to delete phone numbers.
- **“ME”- NVM Module Phonebook:** is used to store and recall phone numbers.
- **“EN”- SIM Emergency List:** is a read only list of the emergency phone numbers stored on SIM
- **“ON”-SIM Own Number:** is the list of the SIM numbers, e.g.: SIM number for voice call and SIM number for data call.

To access the storage the user has to choose one. This must be the first Phonebook operation. Once storage is selected, it is no longer needed to select it again until the desired storage remains the same and the module is not turned off.



3.1.1. Select Phonebook Memory Storage

Use the following AT command to select the Phonebook Memory Storage:

AT+CPBS=<storage>

GSM/GPRS Standards

Examples

AT+CPBS=? ← Read the supported range of Phonebook Storages
 +CPBS: ("SM","FD","LD","MC","RC") ← "MB" is not supported by the inserted
 SIM
 OK

AT+CPBS? ← Read the current Phonebook Storage
 +CPBS: "SM",10,250
 OK

AT+CPBS="FD" ← Select "FD" phonebook storage
 ERROR

AT+CMEE=2
 OK

AT+CPBS="FD"
 +CME ERROR: SIM PIN2 required

AT+CPIN=PIN2 ← Enter PIN2
 OK

AT+CPBS="FD" ← Select "FD" phonebook storage
 OK



NOTE: the last two commands can be substituted by the following one:

AT+CLCK="FD",1,PIN2
 OK

AT+CPBS="MC" ← Select "MC" Phonebook Storage
 OK

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



NOTE: after module power on and PIN authentication, the module reads the data records stored on the SIM. During this activity the phonebook access is inhibited for a time interval depending



on various factors. If Phonebook commands are entered during this interval the module returns an error message. In this case, retry the operations later.

HSPA-GSM/GPRS Standards

Examples

AT+CPBS=? ← Read the supported range of Phonebook Storages
+CPBS: ("SM","FD","LD","MC","RC","DC","ME","EN","ON")
OK

AT+CPBS? ← Read the current phonebook storage
+CPBS: "SM",19,250
OK



3.1.2. Search Phonebook Entries

Use the following AT command to search a Phonebook entry.

AT+CPBF=<findtext>

Examples

Read the current Phonebook storage and select "SM" storage:

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

AT+CPBS="SM"
OK

AT+CPBS?
+CPBS: "SM",10,250
OK

Look 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

Look 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



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



3.1.3. Read Phonebook Entries

Use the following AT command to read a Phonebook entry:

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

Examples

Select "SM" storage:

AT+CPBS="SM"
OK

Look for the entry at the position index = 7:

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

Look for the entries from position 7 up to position 9:

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

The position 8 is empty.

3.1.4. Write Phonebook Entry

Use the following AT command to write a Phonebook entry:

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

Examples

Select the "SM" phonebook:

AT+CPBS="SM"
OK

Write a new record on the first free position of the selected "SM" phonebook:

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

Check where the new record has been written:



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

3.1.5. Delete Phonebook Entry

Use the following AT command with only <index> parameter to delete a Phonebook entry:

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

Examples

Select the "SM" phonebook:

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

Delete record 7 on the "SM" phonebook:

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

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

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



NOTE: the delete command overwrites the <index> record number with an empty record.



3.2. Encryption Algorithm

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

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

In accordance with the response of the **AT#ENCALG=?** Command, you can know the features supported by the command and your Telit Module type.

GSM/GPRS Standards

AT#ENCALG=?
#ENCALG: (0,1,4,5,255),(0-3,255)
OK

HSPA-GSM/GPRS Standards

AT#ENCALG=?
#ENCALG: (0,1,4,5,255),(0-7,255)
OK

Examples

AT#ENCALG=? ← Get the supported parameters range
#ENCALG: (0,1,4,5,255),(0-3,255)
OK

AT#ENCALG? ← Get the current setting
#ENCALG: 5,3,1,0
OK

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

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

AT#ENCALG=0,3 ← no GSM algorithm
OK

AT#ENCALG? ← Setting is not changed
#ENCALG: 5,3,1,0
OK



Turn OFF/ON the module

```
AT#ENCALG?           ← Setting is changed!
#ENCALG: 0,3,0,0
OK
```

3.3. Automatic Data/Time updating

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

AT#NITZ=<val>,<mode>

Examples

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

```
AT#NITZ=153,1           enable full data/time updating
OK
```

```
AT&W0
OK
```

```
AT&P0
OK
```

Power the module OFF/ON.

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

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

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

```
AT+CCLK?
+CCLK: "10/11/30, 14:36:42+04"           ← date/time and time zone
OK
```

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

³ Also enable the automatic Full Network Name updating if it is supported by the Network.



3.4. Call Management

3.4.1. Identifying the Call Type

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

```
AT+CRC=[<mode>]
OK
```

Examples

Disable extended format reporting, and then assume that the module receives a call.

```
AT+CRC=?           ← Check the range value
+CRC: (0,1)
OK
```

```
AT+CRC=0          ← Disable extended format reporting.
OK
```

```
AT+CRC?
+CRC: 0
OK
```

The module detects a call. Ring indications are displayed on DTE:

```
RING
RING
.
```

Now, enable extended format reporting, and then assume the module receives a call.

```
AT+CRC=1          ← Enable extended format reporting
OK
```

```
AT+CRC?           ← Check if extended format reporting is enabled
+CRC: 1
OK
```

The module detects a call. Ring indications in extended format are displayed on DTE:

```
+CRING: VOICE
+CRING: VOICE
.
```



3.4.2. Identify 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 DTE after each RING or +CRING indication. The following AT command is used to enable/disable the Calling Line Indication.

AT+CLIP=[<n>]
OK

Examples

Enable extended format reporting and caller number identification, and then assume to receive a call.

Enable extended format reporting.

AT+CRC=1
OK

Check if extended format reporting is enabled.

AT+CRC?
+CRC: 1
OK

Check the values range.

AT+CLIP?
+CLIP: 0,1
OK

Enable caller number identification.

AT+CLIP=1
OK

AT+CLIP?
+CLIP: 1,1
OK

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

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



3.4.3. Calling Line Indication

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

3.4.3.1. CLIR Service Status

Use the following AT command to query the CLIR Service status.

AT+CLIR?

Examples

Check the current CLIR settings:

AT+CLIR?

+CLIR: 0,4

OK

<n> = 0 = CLIR module facility in accordance with CLIR Network Service

<m> = 4 = CLIR temporary mode presentation allowed (it is the facility status on the Network)

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

3.4.3.2. Restrict/Allow Caller Line ID Indication

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

AT+CLIR=<n>

OK

Examples

Disable the CLI presentation to the other party permanently.

Read the supported values.

AT+CLIR=?

+CLIR: (0-2)

OK

Read the current Module and Network status.



AT+CLIR?

+CLIR: 0,4

OK

Set to 1 Module status, CLI not sent.

AT+CLIR=1

OK

Read the current Module and Network status.

AT+CLIR?

+CLIR: 1,4

OK



HSPA-GSM/GPRS Standards

Examples

Read the supported facilities:

AT+CLCK=?

+CLCK: ("SC", "FD", "AO", "OI", "OX", "AT", "IR", "AB", "AG", "AC", "PN", "PU", "PP", "PC", "PS", "PF", "MC")

OK

3.4.4.2. Call Barring Service Status

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

AT+CLCK=<fac>,2

Examples

Check "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

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

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

AT+CLCK=OI,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

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

Check the status of a non-existent network facility just to see the format response when Extended Error result code is enabled in verbose format.

AT+CMEE=2

OK



AT+CLCK=IX,2

+CME ERROR: operation not supported

Assume that the module is not registered: try to check “OI” network facility status just to see the format response when Extended Error result code is enabled in numeric format.

AT+CMEE=1

OK

AT+CLCK=OI,2

+CME ERROR: 100

3.4.4.3. Bar/Unbar 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>

Examples

Lock and unlock “AI” network facility. Assume that the Network Password provided by Network Operator is 2121.

Check “AI” network facility status:

AT+CLCK=AI,2

+CLCK: 0,1

+CLCK: 0,2

+CLCK: 0,4

OK

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

Lock “AI” network facility:

AT+CLCK=AI,1,2121

OK

Check “AI” facilities status:

AT+CLCK=AI,2

+CLCK: 1,8

+CLCK: 1,4

+CLCK: 1,2

OK

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

Unlock “AI” facilities:



AT+CLCK=AI,0,2121
OK

Check “AI” facilities status:

AT+CLCK=AI,2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK

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

3.4.4.4. Bar/Unbar 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>

Examples

Lock and unlock “IR” network facility. Assume that the network password provided by Network Operator is 2121.

Check “IR” network facilities status:

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

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

Lock “IR” network facility:

AT+CLCK=IR,1,2121
OK

Check “IR” facilities status:

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

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

Unlock “IR” network facility:



AT+CLCK=IR,0,2121
OK

Read IR facilities status:

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

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

3.4.4.5. Bar/Unbar All Outgoing Calls

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

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

Examples

Lock and unlock “AO” network facility. Assume the network password provided by Network Operator is 2121.

Check “AO” network facility status:

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

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

Lock “AO” network facility:

AT+CLCK=AO,1,2121
OK

Check “AO” network facility status:

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

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



Unlock “AO” network facility:

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

Checking “AO” network facility status:

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

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

3.4.4.6. Bar/Unbar All Outgoing International Calls

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

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

Examples

Lock and unlock “OI” network facility. Assume 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
```

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

Lock “OI” network facility:

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

Check “OI” network facility status:

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

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



Unlock “OI” network facility:

AT+CLCK=OI,0,2121
OK

Check “OI” network facility status:

AT+CLCK=OI,2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK

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

3.4.4.7. Bar/Unbar 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>

Examples

Lock and unlock “OX” network facility. Assume the network password provided by Network Operator is 2121.

Check “OX” network facility status:

AT+CLCK=OX,2
+CLCK: 0,1
+CLCK: 0,2
+CLCK: 0,4
OK

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

Lock “OX” network facility. It is a setting not supported by the network:

AT+CLCK=OX,1,2121
ERROR

Enable extended error result codes in verbose format:

AT+CMEE=2
OK

Try again to lock “OX” network facility:

AT+CLCK=OX,1,2121
+CME ERROR: unknown



Check “OX” network facility status:

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

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

3.4.4.8. Unbar All Calls

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

```
AT+CLCK=AB,0,<passwd>
```

Examples

Unlock “AB” network facility. Assume the Network Password provided by Network Operator is 2121.

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

Check “IR” network facility status:

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

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

Check “OI” network facility status:

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

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

Check “AI” network facility status:

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

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



Hang up the voice call:

ATH
OK

3.5.1. DTMF Decoder

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

AT#DTMF=<mode>

Example 1

Check the range of the parameter values

AT#DTMF=?
#DTMF: (0-2)
OK

Check the current value

AT#DTMF?
#DTMF: 0
OK

Enable DTMF decoder

AT#DTMF=1
OK



Example 2

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

Local Module	Remote Module
AT#CPUMODE=1 OK	.
AT#DTMF=1 OK	.
AT#DTMF? #DTMF: 1 OK	.
RING RING	ATD<module number>; OK
ATA	AT+VTS=123 OK
#DTMFEV: 1 #DTMFEV: 2 #DTMFEV: 3	

Use the AT#CPUMODE command in accordance with the used local module and the table below.

Standards (Refer to Applicability Table)	Software Version equal/higher than:	AT#CPUMODE
GSM/GPRS	10.00.xx5, 16.00.xx2	It is mandatory to enter the AT#CPUMODE=1 command.
GSM/GPRS	13.00.xx4	Do not use the AT#CPUMODE command.
HSPA-GSM/GPRS	12.00.xx4	Do not use the AT#CPUMODE command.

#DTMFEV: X is the unsolicited message that gives information concerning the received DTMF tones.



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

Local Module

AT#CPUMODE=1
OK

AT#DTMF=1
OK

AT#DTMF?
#DTMF: 1
OK

RING
RING
ATA

#DTMFEV: 1
#DTMFEV: 2
#DTMFEV: 3

Remote Fixed Phone

.

.

.

.

.

.

Establish a call phone

.

Push button: 1 2 3

.

.

Use the AT#CPUMODE command in accordance with the used local module type as showed in the previous example.



3.6. GSM Power Saving Modes

The Telit Modules provide a function that reduces the power consumption during the period when they are in IDLE state (waiting for a call), allowing a longer activity with a given battery capacity. The power saving function can be configured in several modes in accordance with the user needs.

In accordance with the response of the **AT+CFUN=?** Command, you can know the Power Saving Modes supported by the version of your Telit Module, refer to the table below:

Standards (Refer to Applicability Table)	Software Version equal/higher than:	AT+CFUN=?
GSM/GPRS	10.01.xx1, 13.00.xx7, 16.01.xx1	AT+CFUN=? +CFUN: (0,1,2,4,5,7,9,10,11),(0, 1) OK
HSPA-GSM/GPRS	12.00.xx.4	AT+CFUN=? +CFUN: (0,1,4,5,7,9),(0, 1) OK

Use the following AT command to select the power saving mode in accordance with your Telit Module:

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

Examples

Check the current mode:

AT+CFUN?

+CFUN: 1 ← module with full functionality and power saving disabled (factory setting)

OK

The Tab. 3, showed on next pages, summarizes the transitions between CFUN modes and the events that cause the transition itself. The “Event” column lists the considered events; the shaded row lists the <CFUN> mode when the event happens. The remaining columns show the entered mode of the module after the completion of the transition. In other words: the cell on the crossing between the selected <CFUN>= mode column and row of the selected event shows the final CFUN mode.



Let's suppose to enter the command AT+CFUN=0, AT+CFUN=9 and AT+CFUN=11. These commands cause the module in power saving mode, in addition they force the module to monitor the RTS control line indicating if the user application (DTE) is ready to receive data from the module (DCE):

- When DTE is not ready to receive data from DCE, it forces RTS control line OFF, refer to fig. 2. This condition causes the module (DCE) to power down its serial port and stays in CFUN=0 or CFUN=9 mode, in accordance with the entered command.
- When DTE is ready to receive data from DCE, it forces RTS control line ON, refer to fig. 2. This condition causes the module (DCE) to power up its serial port and enters CFUN=1 mode (Normal Operative Mode, factory setting), if the current CFUN is 0 or 9, or enters in CFUN=11 with serial port enabled. In case of CFUN=11, if the user force RTS control line OFF, the module returns to power saving mode.

In CFUN=5 mode, the module monitors the DTR line (see

fig. 6) indicating if the user application (running on the DTE) is ready to operate:

- When the DTR line is OFF, the user application is not ready to operate and the module enter power saving mode;
- When the user application becomes ready to operate, the DTR line is ON, the module detects this control line condition and exits power saving mode.

In CFUN=7 mode the module forces CTS=OFF (see

fig. 6) when enters power saving mode. After exiting power saving mode, it forces CTS=ON. As stated on paragraph 2.1, CTS control line indicates permission from the DCE for the DTE to send data to the DCE: when the module is not ready to receive data (e.g.: commands) it ties up the CTS line, when it is ready to receive data it ties down the CTS line. The user application can monitor the CTS control line to check if the module is ready for commands, in accordance with V.24 Standard.

In CFUN=10 mode, the module is detached from the network:

- When the DTR line is OFF, the user application is not ready to operate and the module enter power saving mode;
- When the user application becomes ready to operate, the DTR line is ON, the module detects this control line condition and exits power saving mode but it's still detached from the network.





NOTE: when the module is powered ON the power saving function is disabled (CFUN=1, factory setting) in order to guarantee the data exchange between the module and the user device; for this reason the CFUN mode command should be entered after every power up.

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

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

NOTE: Assume that the module is in power saving mode. The paging time range is $0.5 \div 2.1$ sec, it depends upon DRX time set by network; when the module wakes up from the power saving mode, it takes a maximum of 150 ms before checking the DTR line coming from the DTE. If a command is received during the power saving, the module needs at least $0.5 \div 2.1$ sec +150 msec to be ready. Hence, use a delay of at least 2250 msec between the port opening (DTR=ON) and command sending.



NOTE: the +CFUN mode can be saved into the selected profile only if the +CFUN AT command is entered into the module via the AT0 parser (Instance #1)⁴.

HSPA-GSM/GPRS Standards

For HE910 family the functionality of the CFUN=0 is conditioned by the setting of the #ENS command, refer to chapters 2.11.7.3, and 2.11.7.4.

- #ENS=0 → CFUN=0 has the standard functionality
- #ENS=1 → CFUN=0 has the same functionality of CFUN=4

⁴ Refer to [8] or [10] in accordance with the used modules to have information about AT0 parser (Instance #1).



Event	Module is in CFUN MODE when the event (first column) happens							
	<CFUN>=0	<CFUN>=2	<CFUN>=4	<CFUN>=5	<CFUN>=7	<CFUN>=9	<CFUN>=10	<CFUN>=11
Refer to chapter. 2.1 RTS ⁵ = OFF(high) → RTS=ON(low)	CFUN=1	CFUN=2	CFUN=4	CFUN=5	CFUN=7	CFUN=1	CFUN=10	CFUN=11
DTR=OFF(high) or DTR=ON(low)	CFUN=0	CFUN=2	CFUN=4	Refer to fig. 6: DTR=OFF (high) → enter power saving DTR=ON (low) → exit power saving	Refer to fig. 6: Module is in power saving even if DTR=ON (low)	CFUN=9	DTR=OFF (high) → enter power saving, no network activity. DTR=ON (low) → exit power saving but the module is still detached	CFUN=11
Unsolicited Result Code	CFUN=1	CFUN=2	CFUN=4	Module temporary exits power saving mode	Module temporary exits power saving mode	CFUN=1	CFUN=10	CFUN=11
Incoming voice/data call	CFUN=1	N/A	N/A	Module temporary exits power saving mode	Module temporary exits power saving mode	CFUN=1	N/A	N/A
Any AT command	N/A, AT interface disabled	AT interface is working, module remains in CFUN=2 mode	AT interface is working, module remains in CFUN=4 mode	N/A, AT interface disabled	AT interface is enabled. Refer to fig. 6: CTS=OFF: module enters power saving; CTS=ON: module exit power saving.	N/A, AT interface disabled	N/A, AT interface disabled	N/A, AT interface disabled

⁵ CMOS level: asserted = LOW; NOT asserted = HIGH



Event	Module is in CFUN MODE when the event (first column) happens							
	<CFUN>=0	<CFUN>=2	<CFUN>=4	<CFUN>=5	<CFUN>=7	<CFUN>=9	<CFUN>=10	<CFUN>=11
					If user application uses HW flow control the incoming data are blocked when module is in power saving to avoid data losing.			
Incoming SMS AT+CNMI is set to 0,0	CFUN=0	N/A	N/A	CFUN=5	CFUN=7	CFUN=9	N/A	N/A
Incoming SMS AT+CNMI is set to 1,1	CFUN=1	N/A	N/A	Module temporary exits power saving mode	Module temporary exits power saving mode	CFUN=1	N/A	N/A
Incoming GPRS packet	CFUN=0	N/A	N/A	Module temporary exits power saving mode	Module temporary exits power saving mode	CFUN=1	N/A	N/A
RTC alarm	CFUN=1	CFUN=2	CFUN=4	Module temporary exits power saving mode	Module temporary exits power saving mode	CFUN=1	N/A	N/A
AT+CFUN=1	N/A, AT interface disabled	CFUN=1	CFUN=1	N/A, AT interface disabled	CFUN=1	N/A, AT interface disabled	N/A, AT interface disabled	N/A, AT interface disabled

Tab. 3: CFUN modes



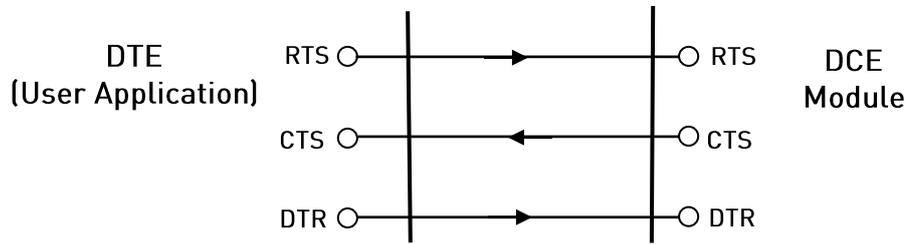


fig. 5: Control Serial lines

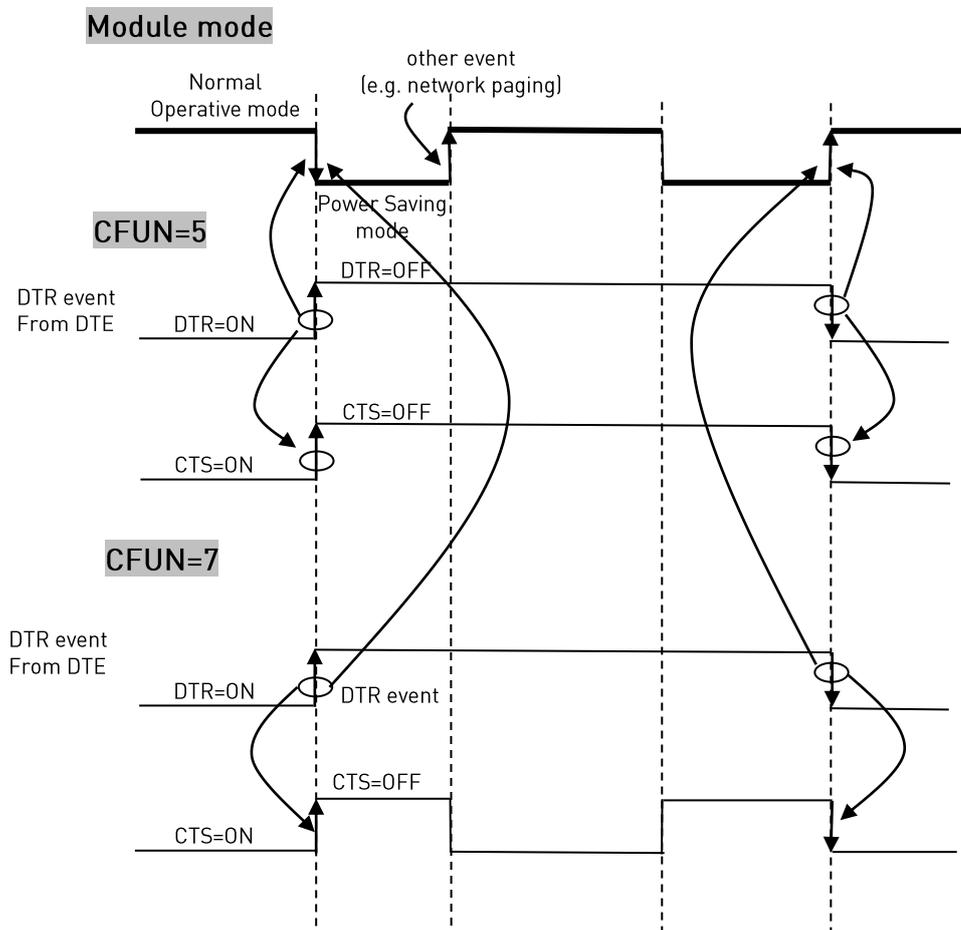


fig. 6: CFUN Mode vs. DTR event



3.7. SMS Management

The Telit Modules support the SMS Service to delete, write, send and receive an SMS, which is a short text message up to 160 characters long. Before using the service, the Short Message Service needs to be configured.

3.7.1. Select SMS Format Type

The Telit Module supports two SMS formats:

- PDU mode
- Text mode

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 he 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>

Examples

Check the supported range of values:

AT+CMGF=?
+CMGF: (0,1)
OK

Set up Text Mode for the SMS:

AT+CMGF=1
OK

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



3.7.1.1. Set Text Mode Parameters

When SMS format is 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>,<dcs>

Example 1

Set the SMS parameters as follow:

- <fo> expressed in binary format:

0	0	0	1	0	0	0	1
Module is not requesting a status report	Always 0	Replay Path not requested	Validity period field present in relative format	Always 0	SMS-SUBMIT		

The binary number expressed in decimal format: 17

- <vp> validity period (in relative format) = 24 hours is coded into 167 decimal format.
- <pid> protocol identifier.
- <dcs> data coding scheme, default value 0.

AT+CSMP= 17,167,0,0
OK

Example 2

Set the SMS parameters as follow:

- <fo> expressed in binary format:

0	0	0	1	1	0	0	1
Module is not requesting a status report	Always 0	Replay Path not requested	Validity period field present in absolute format	Always 0	SMS-SUBMIT		

The binary number expressed in decimal format: 25

- <vp> validity period in absolute format represents the expiration date of the message, for example:
date: 29/06/02; time: 02:20; in the time zone of Italy (+1) is formatted as follows:
"29/06/02,02:20:00+1"
- <pid> protocol identifier.
- <dcs> data coding scheme:
 - Default Alphabet



3.7.1.3. 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 lists 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:

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”.

3.7.1.4. 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.

Select Text Mode.

AT+CMGF=1
OK

Disable improved SMS commands operation mode.

AT#SMSMODE=0
OK

The improved SMS functionality (ETSI Standard compliant) is not enabled. The HSPA-GSM/GPRS modules family supports only the improved SMS functionality, consequently the AT#SMSMODE command is not supported by this modules family.

Select the UCS2 character set.

AT+CSCS="UCS2"
OK

Set SMS parameters:

AT+CSMP=17,168,0,26
OK

Select how the new received message event is indicated by the DCE to the DTE

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

Send the message to the module itself. The “UCS2” character set is used:

number phone 329 05 69 628 is converted into “UCS2” format: 3=0033, 2=0032, 9=0039, 0=0030, 5=0035, 6=0036, 9=0039, 6=0036, 2=0032, 8=0038

text CIAO is converted into “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.

Select the “SMS” storage as indicated by the unsolicited indication.

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

Read the message from 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
```

3.7.2. Read SMSC Number

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

```
AT+CSCA?
```

Example

Check the stored SMSC number:

```
AT+CSCA?
+CSCA: "+39X20XX58XX0",145
OK
```

SMSC number is compliant with the international numbering scheme.

3.7.3. Set SMSC Number

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

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

Examples



Example 1

AT#SMSMODE? ← Check the SMS mode
 #SMSMODE: 1 ← Improved SMS functionality are enabled
 OK

AT+CPMS=? ← Check the supported SMS storage types
 +CPMS: ("SM"),("SM"),("SM") ← Only "SM" storage type is supported
 OK

Example 2

AT#SMSMODE=0 ← Disable improved SMS functionality
 #SMSMODE: 0
 OK

AT#SMSMODE? ← Check SMS mode
 #SMSMODE: 0
 OK

AT+CPMS=? ← Check the supported SMS storage types
 +CPMS: ("ME","SM"), ("SM"), ("SM")
 OK

AT+CPMS? ← Check the current active storage type
 +CPMS: "SM",1,50,"SM",1,50,"SM",1,50
 OK

AT+CPMS="ME" ← Select "ME" storage type
 +CPMS: 1,1,1,50,1,50
 OK

AT+CPMS? ← Check the current active storage types
 +CPMS: "ME",1,1,"SM",1,50,"SM",1,50 ← Two SMS storage types are active: "ME" and "SM"
 OK

The "ME" storage is a volatile read only memory, where only one received message of Class 0 can be stored regardless of the selected storage, which could be "SM".

HSPA-GSM/GPRS Standards

These modules provide only the improved SMS functionality, therefore the #SMSMODE command is not supported;

AT+CPMS=? ← Check the supported SMS storage types
 +CPMS: ("SM"),("SM"),("SM") ← Only "SM" storage type is supported
 OK



SEND THE SMS #1 TO MODULE ITSELF
OK

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

AT+CPMS? ← Check the current active storage types
+CPMS: “ME”,1,1,”SM”,13,50,”SM”,13,50
OK

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

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

The new SMS has overlapped the old one.

HSPA-GSM/GPRS Standards

These modules provide only the improved SMS functionality, therefore the #SMSMODE command is not supported;

3.7.6. Write a new SMS

A new SMS can be written into the “SM” storage type and then can be sent to the desired destination. Use the following AT command to write a new SMS:

AT+CMGW=”<da>”



Use index 6 to read received SMS #1 from “SM” storage memory.

AT+CMGR=6

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

Use index 6 to read again received SMS #1 from “SM” storage memory.

AT+CMGR=6

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



Select “ME” storage type.

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

Use index 1 to read received SMS #1 from “ME” storage type.

```
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
```

Use index 1 to read again received SMS #1 from “ME”.

```
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
```

Example 3

```
AT+CMGF=0 ← Set up PDU Mode
OK
```

Store into “SM” the SMS message to be sent to module itself.

```
AT+CMGW="+39329X569YYY"
+CMS ERROR: 304
```

The command does not work when the module is in PDU Mode.

Set up Text Mode.

```
AT+CMGF=1
OK
```

Store into “SM” the SMS message to be sent to module itself.

```
AT+CMGW="+39329X569YYY"
> EDIT NEW SMS ...(use ESC to abort the command.)
OK
```

3.7.7. Send a Stored SMS

An SMS stored into the “SM” storage type 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>
```



GSM/GPRS Standards⁶, HSPA-GSM/GPRS Standards

Example

Send the stored SMS to the module itself:

AT+CMGF=1 ← Select Text Mode
OK

AT+CPMS="SM" ← Select "SM" storage to read SMS
+CPMS: 1,50,1,50,1,50
OK

Read the SMS stored on position 1.

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

Select how the new received message event is indicated by the DCE to the DTE.

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

Send the stored SMS # 1 message to module itself.

AT+CMSS=1
+CMSS: 79
OK

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

+CMTI: "SM",2

3.7.8. Send a New SMS without Storing It

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

AT+CMGS="<da>"

GSM/GPRS Standards⁷, HSPA-GSM/GPRS Standards

Example

Send the SMS message to the module itself and not store it before transmitting.

AT+CMGF=1 ← Select Text Mode.
OK

⁶ Use AT#SMSMODE=1.

⁷ Use AT#SMSMODE=1.



Select how the new received message event is indicated by the DCE to the DTE.

```
AT+CNMI=1,1,0,0,0
OK
```

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: "SM",1
```

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 “SM” storage.

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

```
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
```

3.7.9. Send a New SMS using GPRS service

An SMS can be sent by means of the GPRS service [4]. It is worth to remind that not all Network Operators support this features.

```
AT+CGSMS=2
```

GSM/GPRS Standards⁸, HSPA-GSM/GPRS Standards

Examples

Send the SMS message to the module itself, not store it before transmitting and use the GPRS service

⁸ Use AT#SMSMODE=1.



AT#SELINT=2 ← Select AT command interface style
OK

AT+CGSMS=2 ← Select the GPRS service
OK

Check if the module is attached to GPRS service

AT+CGATT?
+CGATT: 1
OK

Select Text Mode.

AT+CMGF=1
OK

Select how the new received message event is indicated by the DCE to the DTE.

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

Send the message to the module itself.

AT+CMGS="+386X18X19X4"
> **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 the SMS for the first time.

AT+CMGR=11
+CMGR: "REC UNREAD","+386X18X19X4","","09/08/03,14:14:04+08"
SEND THE SMS BY MEANS OF THE GPRS SERVICE TO ITSELF
OK



AT+CMGD=? ← Check the SMS.
+CMGD: (1),(0-4)
OK

AT+CMGD=1 ← Delete SMS in storage position 1
OK

Check if the SMS is deleted.

AT+CMGD=?
+CMGD: (),(0-4)
OK

3.7.11. Read an SMS

An SMS is read with the following command:

AT+CMGR=<index>

GSM/GPRS Standards⁹, HSPA-GSM/GPRS Standards

Example

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

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

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

3.7.12. SMS Status

SMSs can be gathered 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

⁹ Use AT#SMSMODE=1.



AT#SMSMODE=0

OK

Check the supported storage types

AT+CPMS=?

+CPMS: "ME", "SM"), ("SM"), ("SM")

OK

Check if Text Mode is active.

AT+CMGF?

+CMGF: 1

OK

Check the supported SMS status.

AT+CMGL=?

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

OK

Select "ME" storage type.

AT+CPMS="ME"

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

OK

List SMSs stored in the "ME" storage type.

AT+CMGL="ALL"

+CMGL: 1, "REC READ", SMS body

OK

AT+CMGL="REC UNREAD"

OK



3.7.13. Cell Broadcast Service

GSM Standard specifies two different types of SMS:

- SMS Point to Point (SMS/PP),
- SMS Cell Broadcast (SMS/CB).

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

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

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

Example

Select Text Mode.

AT+CMGF=1
OK

Select the District service.

AT+CSCB=0,50,0
OK

Select how the new received message event is indicated by the DCE to the DTE.

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

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

+CBM: 24,50,1,1,1
TRIESTE

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

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

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

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

<mids>	Service name
000	Index
010	Flashes
020	Hospitals



022	Doctors
024	Pharmacy
030	Long Distant Road Reports
032	Local Road Reports
034	Taxis
040	Weather
050	District
052	Network Information
054	Operator Services
056	Directory Inquiries (national)
057	Directory Inquiries (international)
058	Customer Care (national)
059	Customer Care (international)

3.7.14. Read concatenated SMS

Use the following AT command to read concatenated SMSs:

AT#CMGLCONCINDEX

Example

Check the number of stored SMSs

AT+CPMS?
+CPMS: "SM",6,30,"SM",6,30,"SM",6,30
OK
6 SMSs are stored.

Check if concatenated SMSs are stored

AT#CMGLCONCINDEX
OK
No concatenated SMSs are stored

Set up Text Mode

AT+CMGF=1
OK

Set SMS parameters

AT+CSMP=17,167,0,242
OK

Store two concatenated SMSs (they are indicated with two colors):

AT+CMGW= "+3932X056Y6X8"




```
AT+CMGR=8
+CMGR: "STO UNSENT","+3932X056Y6X8",""
3456789098765432109876543210
OK
```

3.8. GPIO Pins

Telit Modules provide various GPIO pins, which can be configured, by means of the AT commands, as showed hereafter:

- Inputs,
- Outputs,
- “Alternate Functions”.

User applications, running on DTE or on the module itself, through GPIO AT commands, can control external user equipments connected to GPIO pins. Few or no circuitries are needed to perform the required hardware interface. For detailed GPIO pins descriptions from the circuitry point of view refer to [3] in accordance with the used module. Tab. 4 summarizes the Telit Modules covered by this guide and their GPIO pins.

3.8.1. Set 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
```

Examples

Set GPIO8 pin as Output with Low status:

```
AT#GPIO=8,0,1
```

OK

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

Set GPIO8 pin as Output with High status:

```
AT#GPIO=8,1,1
```

OK

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



NOTE: in general, GPIO setting is not saved on module power off. At power on, repeat pin setting commands. For more details refer to [3] in accordance with the used module.



Families and Products For Software Versions refer to Applicability Table		GPIO < PIN > description									
		GPIO < pin > range	At Power on GPIO are configured as input (if not used as alternate function). User settings (output) are not saved and will be lost on Power off.	The user settings of GPIO are maintained even after a Power off to permit "Alternate Functions" to be always properly set.	Alternate Functions						
					RF TX Contr., See 3.8.4.1	RF TX Mon., See 3.8.4.2	ALARM Output, See 3.8.4.3	BUZZER Output See 3.8.4.4	Stat Led ¹¹ See 3.8.4.5	Jamming See 3.8.4.6	
GC Family (Compact)	SW Version										
GC864-QUAD	10.00.xxx	1 – 22	1 – 22	4,5,6,7	4	5	6	7	ded.	2	
GC864-QUAD V2		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GC864-DUAL V2		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GE/GL Family (Embedded)											
GE864-QUAD	10.00.xxx	1 – 22	1 – 22	4,5,6,7	4	5	6	7	ded.	2	
GE864-QUAD V2		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GE864-QUAD Automotive V2		1 – 9	1 – 9	4,5,6,7	4	5	6	7	ded.	1	
GE864-QUAD ATEX		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GE864-DUAL V2		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GE864-GPS		1 – 10	1 – 10	4,5,6,7	4	5	6	7	ded.	2	
GE865-QUAD		1 – 10	1 – 8	4,5,6,7	4	5	6	7	ded.	2	
GL865-DUAL		1 – 8	1 – 8	4,5,6,7,8	4	5	6	7	8	2	
GL865-QUAD		1 – 8	1 – 8	4,5,6,7,8	4	5	6	7	8	2	
GL868-DUAL		1 – 8	1 – 8	4,5,6,7,8	4	5	6	7	8	2	
GE910-QUAD		13.00.xxx	1 – 10	1 – 10	1,5	N/A	5	N/A	N/A	1	N/A
GE910-GNSS			1 – 10	1 – 10	1,5	N/A	5	N/A	N/A	1	N/A
GL865-DUAL V3		16.00.xxx	1 – 8	1 – 8	4,5,6,7,8	4	5	6	7	8	2
GL865-QUAD V3	1 – 8		1 – 8	4,5,6,7,8	4	5	6	7	8	2	
GL868-DUAL V3	1 – 8		1 – 8	4,5,6,7,8	4	5	6	7	8	2	
GE910-QUAD V3	1 – 10		1 – 10	1,5	N/A	5	N/A	N/A	1	N/A	

¹¹ “ded.” indicates dedicated pin, no GPIO is used.



Families and Products For Software Versions refer to Applicability Table		GPIO < PIN > description									
		GPIO < pin > range	At Power on GPIO are configured as input (if not used as alternate function). User settings (output) are not saved and will be lost on Power off.	The user settings of GPIO are maintained even after a Power off to permit "Alternate Functions" to be always properly set.	Alternate Functions						
					RF TX Contr., See 3.8.4.1	RF TX Mon., See 3.8.4.2	ALARM Output, See 3.8.4.3	BUZZER Output See 3.8.4.4	Stat Led ¹ See 3.8.4.5	Jamming See 3.8.4.6	
GT Family (Terminal)											
GT863-PY	10.00.xxx	4 - 7	4 - 7	4,5,6,7	4	5	6	7	N/A	N/A	
GT864-QUAD	10.00.xxx	4 - 7	4 - 7	4,5,6,7	4	5	6	7	N/A	N/A	
GT864-PY		4 - 7	4 - 7	4,5,6,7	4	5	6	7	N/A	N/A	
HE910 Family											
HE910	12.00.xxx	1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
HE910-GA		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
HE910-D		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
HE910-EUR / HE910-EUD		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
HE910-EUG / HE910-NAG		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
HE910-NAR / HE910-NAD		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
UE910 Family											
UE910-EUR / UE910-EUD	12.00.xxx	1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	
UE910-NAR / UE910-NAD		1 - 10	1 - 10	1 - 10	N/A	N/A	1 - 10	N/A	1	N/A	

Tab. 4: GPIO pins description



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

Check the GPIO8 status.

AT#GPIO=8,2

#GPIO: 1,1

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

Check the supported range of pin, mode and direction. The command response depends on the module under test.

AT#GPIO=?

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

OK



NOTE: the command response is function of the pin direction:

- input: the command response indicates the current input status;
- output: the command response indicates the last pin set status;

If GPIO pin is set to Alternate Function mode, the reported status is not valid.

3.8.4. GPIO & Alternate Function

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

3.8.4.1. GPIO4 Pin as RF Transmission Control

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

AT#GPIO=4,<dummy_value>,2



NOTE: the GPIO4 pin is set in input direction; the setting is saved at module power off. In accordance with the module under test, refer to [3] for details on circuitry pin topic.

3.8.4.2. GPIO5 Pin as RFTXMON OUTPUT

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

AT#GPIO=5,<dummy_value>,2

Example



Set GPIO5 pin as RFTXMON OUTPUT:

AT#GPIO=5,0,2

OK

GPIO5 pin is successfully set in RFTXMON OUTPUT Alternate Function mode.



NOTE: the GPIO5 pin is set in output direction; the setting is saved at module power off.

3.8.4.3. GPIO6 Pin as ALARM OUTPUT

The GPIO6 pin is provided with circuitry in order 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 through the GPIO6 can monitor the ALARM status. Use the following AT command to set the GPIO6 pin in “ALARM OUTPUT” Alternate Function mode.

AT#GPIO=6,<dummy_value>,2

Example

Set GPIO6 pin as ALARM OUTPUT:

AT#GPIO=6,0,2

OK

GPIO6 pin is successfully set in ALARM OUTPUT Alternate Function mode.



NOTE: the GPIO6 pin is set in output direction, the setting is saved after module power off. Use +CALA command to setup the needed ALARM setting working with GPIO6.

3.8.4.4. GPIO7 Pin as BUZZER OUTPUT

The GPIO7 pin is provided with circuitry in order to be used as “BUZZER OUTPUT”. Use the following AT command to set the GPIO7 pin in “BUZZER OUTPUT” Alternate Function mode.

AT#GPIO=7,<dummy_value>,2

Example

Set GPIO7 pin as BUZZER OUTPUT:

AT#GPIO=7,0,2

OK

GPIO7 pin is successfully set in BUZZER OUTPUT Alternate Function mode.



NOTE: the GPIO7 pin is set in output direction, the setting is saved at module power off. Use #SRP command to setup the needed BUZZER configuration.



3.8.4.5. Set STAT_LED GPIO

The Network Service availability and Call status can be indicated through the blinking light of a led connected to a GPIO by means of a simple circuitry. The GPIO used for this function depends from the product as showed on Tab. 4. This GPIO is called STAT_LED pin and can be configured using the following AT command.

Enable the function

AT#SLED=2
OK

Save the setting

AT#SLEDSAV
OK

Disable the function

AT#SLED=0
OK

Now, the used GPIO is free to be used for other functions.

3.8.4.6. Set “Jam” GPIO

GC, GE/GL families

Jamming devices interfere with GSM communications corrupting signals belonging to a GSM band. GPIO2 can be used to give information concerning the presence/absence of jamming activity in that area. It can be configured using the following AT command.

Enable GPIO2 as jamming activity indicator and select the Method 1 to evaluate the presence/absence of jamming.

AT#JDRENH=1,1
OK

Disable GPIO2 as jamming activity indicator.

AT#JDRENH=0
OK

Enable GPIO2 as jamming activity indicator and select the Method 2 to evaluate the presence/absence of jamming. To perform the evaluation using Method 2, the module must be powered on when jamming activity is not present.

AT#JDRENH=1,2
OK



3.8.5. Clock and Alarm Functions

Telit Modules provide Real Time Clock and Alarm features to implement the following functions:

- Set up the right time
- Check the actual time
- Set up an alarm time

Use +CALA command to perform the alarm setting. In general, update the Telit Module clock before using the Alarm feature.

On alarm trigger the Telit Module can do the following:

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

Once woken up, the Telit Module can perform one of the following actions:

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

Example of actions that Telit Module can perform using above stated features:

- Wake up itself and its controlled hardware, through the GPIO6 pin, at the desired time: a timely survey can be programmed without the need to power on any hardware; the objective is to minimize the power consumption.
- 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 through the previously programmed unsolicited code "+CALA:<user_text>".
- Alert the user playing the alarm tone.

3.8.5.1. Set Module Clock

Use the following AT command to update the module clock.



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

Read the current time

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

Read the current time

AT+CCLK?
+CCLK: "08/07/18,10:19:48"
OK

The Alarm time is not reached

Delete the Alarm configuration

AT+CALD=0
OK

Read the current time

AT+CCLK?
+CCLK: "08/07/18,10:22:37"
OK

The Alarm time is over, the unsolicited +CALA: NEW ALARM message is not appeared on the DTE in accordance with AT+CALD=0 command.

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

Read the current time

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

Set up the Alarm configuration

AT+CALA="08/07/18,10:48:00+00",0,2,"NEW1 ALARM"
OK

Read the current time

AT+CCLK?
+CCLK: "08/07/18,10:44:25"
OK

The Alarm time is not reached



Delete the Alarm configuration

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

Read the current time

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

The Alarm time is still not reached

Read the current time

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

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

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

Read the current time

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

Set up a recurrent Alarm configuration for all days in the week

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

Read the current time

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

The response shows that the Alarm time is still not reached.

The Alarm time is reached, the module displays on the DTE the previously configured unsolicited code:

```
+CALA: NEW2 ALARM
```



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

```
.
.
```

Exit “Alarm Activity” and enter “Normal Operating Mode”

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

Set up the new day to simulate the passing of time

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

Read the current time

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

The response shows that the Alarm time is still not reached

The Alarm time is reached, the module displays on the DTE the configured unsolicited code set up yesterday! :

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

```
.
```



NOTE: the Alarm time refers to the local time, regardless the time zone set by +CCLK command.

If GPIO6 pin is used as ALARM OUTPUT, it must be configured in “Alternate Function” mode (see paragraph 3.8.4.3) or else the pin will not respond to the Alarm settings.

If the unsolicited code +CALA: <text> is used, the serial port speed must be configured as needed (see paragraph 2.5) and stored in the active profile (see AT&W command), in order to perform the Telit Module power on with the desired serial port speed. Differently, at the Alarm wakeup, the module will start with the default port speed that should differ from the speed set on DTE.



3.8.5.4. Postpone Alarm Time

Use the following AT command to postpone the Alarm configuration. It is not supported by modules equipped with Software Version 7.03.xx3, see Applicability Table.

AT+CAPD=<time>

Examples

Read the current time

AT+CCLK?

+CCLK: "09/08/05,09:24:46+04"

OK

Set up the Alarm configuration

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

OK

Postpone of 60 seconds the just configured Alarm

AT+CAPD=60

OK

The Alarm time is reached, the module displays on the DTE the configured unsolicited code:

+CALA: NEW ALARM

+CALA: NEW ALARM

.

.

3.8.5.5. Stop Alarm Activity

When the "Alarm Time" is reached, the module starts the "Alarm Activity" according to the previous "Alarm Setting". There are three ways to stop the "Alarm Activity". The user can do the following:

- Shutdown the module
- Exit from "Alarm Activity" and enter the "Normal mode"
- Let the "Alarm Activity" continue until the 90 sec timeout is expired

Exit from the Alarm Status and Shutdown:

use the following AT command, the module exits "Alarm Activity" and shuts down.



AT#SHDN
OK

The module and the equipment are powered OFF.

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

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

The module recognizes the unsolicited code and forces itself in operating mode:

AT#WAKE=0
OK

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

Read the current time.

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

Calculate and set up the next alarm time to program the GPIO6 pin which is responsible to power up the user equipment that does not need to be powered up all the time.

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

Shut down the module and the equipment.

AT#SHDN
OK

The module and the equipment are powered OFF. This sequence is repeated every hour.



4. Firmware Update Tool

The Telit Modules firmware is updated through the serial interface normally used to enter AT commands.

Generally speaking, it is suggested to provide an RS232 interface on the user printed circuit board (on which Telit Module is soldered) to perform the physical connection between Telit Module and Windows-based PC; that simple circuitry makes it easier to update firmware when the installation of a new firmware version is required.

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 the Windows-based PC on which a dedicated tool for firmware updating is running.

Telit provides the user with a suitable tool to update the firmware of the modules. The following paragraphs describe it.



NOTE: GT terminals are completely cased modems (refer to Applicability Table) and provide the standard RS232 port that can be used to perform firmware update.

4.1. Xfp Tool

The firmware update can be performed with the Xfp Tool running on Windows based PCs. It erases the flash memory content, and then downloads the new firmware on the flash memory.

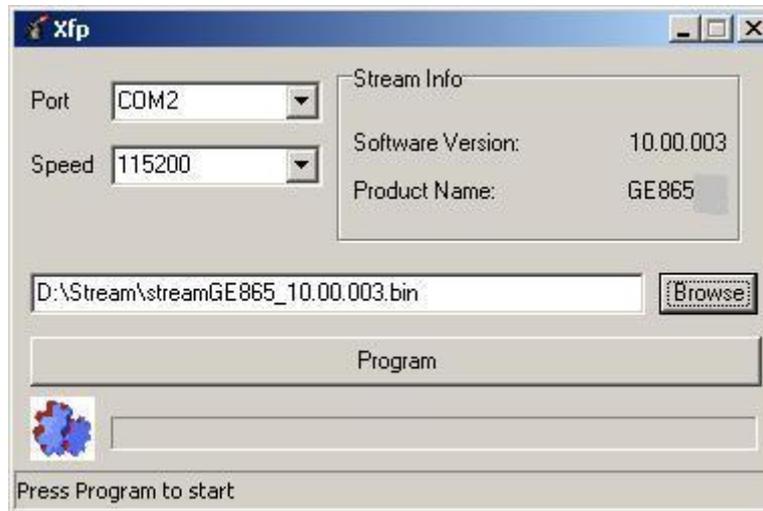
4.1.1. Upgrade Procedure

To update the firmware follow the showed procedure:

1. check the Telit Module and Software version using the listed AT commands:
 - **AT+CGMR<cr>**, returns the software version information;
 - **AT+CGMM<cr>**, returns the Telit Module identification.
2. Switch OFF the module.
3. Run the Xfp.exe tool, the following windows are displayed. Select COM port, speed¹² and stream file (stream file holds new firmware). For UC and CC products use the Auxiliary Port, refer to [15]. UC and CC products are out of the scope of the present document, they are mentioned here because Xfp tool supports them and also the modules covered by this guide.

¹² To use speed greater than 115200 Bps a dedicated hardware on PC is needed.





4. Read the instructions and follow them. The following windows are displayed on the screen when the module is successfully programmed.



4.1.1.1. Command Line running Xfp tool

The Telit Module Upgrade Procedure can be performed by means of a command line running the Xfp tool in MS-DOS environment.

The command line (use a space between two consecutive parameters) is:

Xfp stream_file port speed [autoterminate] [linktimeout]

Where:

Xfp is the tool described on paragraph 4.1.1;

stream_file file that must be downloaded (full path);

port COM1, COM2, ..., in accordance with the PC configuration;

speed 9600, ..., in accordance with the PC configuration;

autoterminate if 0: Xfp doesn't exit at the downloading end, regardless of the result of the just performed activity;

if 1: the Xfp exits at the downloading end, regardless of the result of the just performed activity;

Default value = 0.

linktimeout linktimeout value expressed in sec. Suggested range: 5 ÷ 60 [sec]. Default value = 60 [sec]. If linktimeout is used, must be used also autoterminate parameter.

Exit Codes:

0	OK
4	stream not found
5	can't open port
-4	link failure
-9	timeout / error
-11	speed error

Exit Codes are displayed on the screen when Xft tool is closed.



The following example of VBScript can be used in order to avoid the manual entry of the parameters above listed:

```

=====
'
'          TELIT COMMUNICATIONS S.P.A
'
'          VBScript Source File Name: XfpDOS.VBS
'
'          14th June 2010
'
=====

Dim WshShell
Dim oExec
Set WshShell = CreateObject("WScript.Shell")
Command = "c:\Program\Telit\xfp\Xfp.exe D:\Stream\streamGE865_10.00.003.bin COM2 115200 0 60"
WScript.Echo "Start: " & Now()
WScript.Echo "Executing: " & Command
Set oExec = WshShell.Exec(Command)
Do While oExec.Status = 0
    WScript.Sleep 100
Loop
WScript.Echo "ExitCode: " & oExec.ExitCode
WScript.Echo "Stop: " & Now()
WScript.Quit
=====

```

Follow these steps to run the XfpDOS.VBS script:

- 1) Enter MS-DOS environment
- 2) Enter the command : CSCRIPT XfpDOS.VBS <CR>



6. Abbreviation and acronyms

BCCH	Broadcast Control Channel
CSD	Circuit Switched Data
CTM	Cellular Text Telephone Modems
CTS	Clear To Send
DCE	Data Circuit-Terminating Equipment (refer to [14])
DRX	Discontinuous Reception
DTE	Data Terminal Equipment (refer to [14])
DTMF	Dual Tone Multiple Frequency
DTR	Data Terminal Ready
GERAN	GSM EDGE Radio Access Network
GPIO	General Purpose Input/Output
HF	Hands Free (old terminology)
HS	Hand Set (old terminology)
HSPA	High Speed Packet Access
IRA	International Reference Alphabet
ME	Mobile Equipment
MSISDN	Mobile Station International Subscriber Directory Number
NMEA	National Marine Electronics Association
NVM	Non-Volatile Memory
PDU	Protocol Data Unit
PIN	Personal Identification Number
SIM	Subscriber Identification Module
SMS	Short Message Service
SMSC	Short Message Service Center
TTY	Text Telephone Typewriter
UART	Universal Asynchronous Receiver Transmitter
URC	Unsolicited Result Code
USIM	Universal Subscriber Identification Module
UTRAN	Universal Terrestrial Radio Access Network

