

# UC864-K Software User Guide

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# 1. Overview

The purpose of this document is the description of some common AT command procedures that may be used with the Telit UC864-K module. In this document, all the basic functions of a mobile phone are taken into account and for each one of them, a proper command sequence will be suggested. In the Advanced operation section the more useful services and features of the GSM and WCDMA network supported by the Telit UC864-K module is taken into account and some command sequence and usage are provided for each one of them. This document and its suggested command sequences must not be considered mandatory; instead, the information given must be used as a guide for properly using the Telit module. For further commands and features that may not be explained in this document refer to the UC864-K Product Description document where all the supported AT commands are reported.



**NOTICE:**

(EN) The integration of the WCDMA/HSDPA/GSM/GPRS UC864-K cellular module within user application must be done according to the design rules described in this manual.

(IT) L'integrazione del modulo cellulare WCDMA/HSDPA/GSM/GPRS UC864-K all'interno dell'applicazione dell'utente dovrà rispettare le indicazioni progettuali descritte in questo manuale.

(DE) Die Integration des WCDMA/HSDPA/GSM/GPRS UC864-K Mobilfunk-Moduls in ein Gerät muß gemäß der in diesem Dokument beschriebenen Konstruktionsregeln erfolgen

(SL) Integracija WCDMA/HSDPA/GSM/GPRS UC864-K modula v uporabniški aplikaciji bo morala upoštevati projektna navodila, opisana v tem piročniku.

(SP) La utilización del modulo WCDMA/HSDPA/GSM/GPRS UC864-K debe ser conforme a los usos para los cuales ha sido diseñado descritos en este manual del usuario.

(FR) L'intégration du module cellulaire WCDMA/HSDPA/GSM/GPRS UC864-K dans l'application de l'utilisateur sera faite selon les règles de conception décrites dans ce manuel.

(HE) האינטגרציה של המודול המצורף UC864-K עם המוצר. תהליך האינטגרציה של המודול המצורף.

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## 2. Basic Operations

### 2.1. Command Syntax

In the next paragraphs the following notations are used:

**<cr>** represents the Carriage Return Character (13)

**<lf>** represents the Line Feed Character (10)

**<xx>** represents a parameter with changing name is in place of the double x. (< and > characters are only for limiting the parameter and must not be issued to the terminal).

**[<xx>]** represents an optional parameter whatever name is in place of the xx. ([ and ] characters are only for limiting the optional parameter and must not be issued to the terminal).

### 2.2. Command Response Timeout

Every command issued to the Telit UC864-K returns a result response if response codes are enabled (default) (see command ATQn). The time needed to process the given command and return the response varies and may depend also on the network on which the command may interact. As a result, every command is provided with a proper timeout time. If this time elapses without any result from the operation, then the ERROR response is reported as if the operation was not successful.

The timeout time is quite short for commands that imply only internal set up commands, but may be very long for commands that interact with the network (or even Networks).



#### NOTE:

In case no response is received after the timeout time has been elapsed, then try repeating the last command and if still no response is received until the timeout time, an Unconditional Shutdown MUST be issued and the device must be powered ON again.

In the table below are listed all the commands whose timeout differs from the default 100 ms and their effective timeout is reported:

Command	Time-Out (Seconds)
+CBST	0.2
+CR	0.2
+CRC	0.2
+CRLP	0.2
+CSCS	0.2
+CEER	5



<b>Command</b>	<b>Time-Out (Seconds)</b>
+CGMI	5
+CGMM	5
+CGMR	5
+CGSN	20
+CIMI	20
+CNUM	20
+CREG	5
+COPS	180
+CLCK	180
+CPWD	180
+CLIP	180
+CLIR	180
+CCFC	180
+CCWA	20
+CHLD	20
+CUSD	180
+CAOC	20
+CSSN	20
+CLCC	20
+CPAS	5
+CPIN	20
+CSQ	5
+CPBS	5
+CPBR	20
+CPBF	20
+CPBW	20
+CALM	5
+CRSL	5
+CLVL	5
+CMUT	5
+CACM	20
+CAMP	20
+CPUC	20
+CMEE	5
+VTS	20
+GMI	5
+GMM	5
+GMR	5
+GSN	20
+CSMS	5
+CPMS	5
+CMGF	5
+CSCA	20
+CSMP	5
+CSDH	5



Command	Time-Out (Seconds)
+CSAS	5
+CRES	5
+CNMI	5
+CMGS	180 / 5 for prompt">"
+CMSS	180
+CMGW	5 / 5 for prompt">"
+CMGD	5
+CMGR	5
+CMGL	5
#CAP	10
#SRS	10
#SRP	10
#STM	10
#PCT	10
#SHDN	10
#QTEMP	10
#MONI	10
#CGMI	5
#CGMM	5
#CGMR	5
#CGSN	20
#CIMI	5
+CGACT	180
+CGATT	180
+CGDATA	20
+CGDCONT	20
+CGPADDR	20
+CGQMIN	20
+CGQREQ	20

## 2.3. Turning ON/OFF the UC864-K

Please refer to UC864-K Hardware User Guide



## 2.4. Checking WCDMA Device Functionality

After a proper power on, the device is ready to receive AT commands on the USB or serial port.

Several things must be checked in order to be sure that the device is ready to send and receive calls and SMS.

### 2.4.1. Baudrate

UC864-K does not support autobauding. Users have to set the right speed for serial communication before device initialization. If UC864-K set the right speed, the device responds with OK. The default baudrate is 115200.

- send command `AT+IPR=<rate><cr>`
- wait for OK response

where rate is the port speed and can be 0, 300,1200,2400,4800,9600,19200,38400,57600,115200, 230400 bps.



#### TIP:

The USB or serial port suggested setting is: port speed 115200, character format 8N1 (8 bit per char, No parity bit, 1 stop bit).

### 2.4.2. SIM Presence Checking

The first thing to check is the SIM presence and PIN code insertion. This can be done with the following commands:

#### 2.4.2.1. Enable the Extended Error Result Codes

- send command `AT+CMEE=1<cr>`
- wait for **OK** response
- or if you prefer the verbose format instead of the numerical format then: send command `AT+CMEE=2<cr>`
- wait for **OK** response



### 2.4.2.2. Query SIM Presence and Status

- send command **AT+CPIN?<cr>**
- wait for response:

Response	Reason	Action
+CPIN: SIM PIN	SIM is present and PIN is required to continue operations	Proceed to par. 2.7.2.3
+CPIN: SIM PUK	SIM is present and 10 attempts to give SIM PIN have failed, so SIM is blocked	Send command <b>AT+CPIN=&lt;SIM PUK&gt;</b>
+CPIN: SIM PIN2	SIM is present and 3 attempts to give SIM PIN2 have failed, so SIM PUK2 is required	Proceed to par. 2.7.2.3
+CPIN: SIM PUK2	SIM is present and 10 attempts to give SIM PUK2 have failed, so SIM PIN2 cannot use anymore.	Send command <b>AT+CPIN=&lt;SIM PUK&gt;</b>
+CPIN: READY	SIM is present and no PIN code is required to proceed	Proceed ahead
+CME ERROR: 10	SIM is not inserted	Insert SIM or require SIM insertion and repeat from par. 2.7.2.2
+CME ERROR: 13	SIM is failure	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.2
+CME ERROR: 14	SIM is busy	retry later
+CME ERROR: 15	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).

### 2.4.2.3. Provide SIM PIN (only if required see point 2.7.2.2)

- send command **AT+CPIN=\*\*\*\*<cr>** where \*\*\*\* stands for the SIM PIN code (e.g. 1234)
- wait for response:

Response	Reason	Action
OK	SIM PIN was correct	Proceed ahead
ERROR	the PIN code inserted is not correct	Retry from par. 2.7.2.2



#### NOTE:

When receiving the ERROR message, repeat Query SIM presence and status since after 3 failed attempts SIM PIN is not requested anymore, but SIM PUK is requested instead. You may need to go through procedure 2.7.2.4



#### 2.4.2.4. Provide SIM PUK (only if required see par. 2.7.2.2)

- send command **AT+CPIN=\*\*\*\*\*,<newpin><cr>** where \*\*\*\*\* stands for the SIM PUK code (e.g. 12345678) and <newpin> (e.g. 1234) will replace the old pin in the SIM.
- wait for response:

Response	Reason	Action
OK	SIM PUK was correct	Proceed ahead
ERROR	the SIM PUK code inserted is not correct	Retry from par. 2.7.2.4



#### TIP:

When receiving the ERROR message, be careful to check if the SIM PUK is correct before trying again. After 10 failed attempts to provide the SIM PUK the SIM Card will lock and will not be usable anymore.

#### 2.4.3. Network Checking

##### 2.4.3.1. Query Network Status

- send command **AT+CREG?<cr>**
- wait for response:

Response	Reason	Action
+CME ERROR: 10	SIM not present or damaged	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CME ERROR: 11	SIM is present and PIN is required to continue operations	Repeat par. 2.7.2.3
+CREG: 0,0 or +CREG: 1,0	No network is found	Check for antenna cable connection (antenna may be disconnected or damaged) or change position if the antenna is OK. Repeat par. 2.7.3.1 until a network is found.
+CREG: 0,1 or +CREG: 1,1	Mobile is registered on its home network.	Proceed ahead. Ready to call
+CREG: 0,2 or +CREG: 1,2	Mobile is currently not registered on any network but is looking for a suitable one to register.	Repeat procedure at par. 2.7.3.1 to see if it has found a suitable network to register in.
+CREG: 0,3 or +CREG: 1,3	Mobile has found some networks but it is not allowed to register on any of them, no roaming was allowed.	Try in another place, and repeat procedure at par. 2.7.3.1



+CREG: 0,4 or +CREG: 1,4	Mobile is in an unknown network status	Repeat procedure at par. 2.7.3.1 to see if it has found a suitable network to register in
+CREG: 0,5 or +CREG: 1,5	Mobile has found some networks and is currently registered in roaming on one of them	Proceed ahead. Ready to call



**TIP:**

When a response **+CREG: x,1** or **+CREG: x,5** is received, then the device is ready to place and receive a call or SMS. It is possible to jump directly to call setup procedures or SMS sending procedures.

**2.4.3.2. Network Operator Identification**

Once the mobile has registered on some network (or even if it has returned +CREG:x,3), it is possible to query the mobile for network identifications, codes and names:

- send command **AT+COPS=?<cr>**
- wait for response in the format:

**+COPS: : [list of supported (<stat>,long alphanumeric <oper>,short alphanumeric <oper>,numeric <oper>,< AcT>)s]**

**[,,(list of supported <mode>s),(list of supported <format>s)]**

where:

**<stat>** - operator availability

0 - unknown

1 - available

2 - current

3 - forbidden

**<AcT>** access technology selected:

0 GSM

2 UTRAN



**NOTE:**

Since with this command a network scan is done, this command may require some seconds before the output is given.

For example:

command



**AT+COPS=?<cr>**

Answer:

**+COPS: (2,"I WIND","WIND","22288",2),(1,"SI MOBITEL GSM","","29341",0),(1,"Vodafone IT","OMNITEL","22210",2), (3,"I TIM","TIM","22201",0),(0-4),(0-2)**

**OK**

In this case the mobile is registered on the network **"I WIND"** which is a network from Italy, code: 222 and Network ID: 88. There is also another network available for registration:

**"SI MOBITEL GSM"** which is a network from Slovenia, code: 293 and Network ID: 41 ,

**"SI.MOBIL"** which is a network from Slovenia, code: 293 and Network ID: 40 and Vodafone IT from Italy with Nation code 22 and Network 10.

The other network is not available for registration:

**"I TIM"** from Italy, code: 222 and Network ID: 01 - FORBIDDEN



**TIP:**

In this case a **"I TIM"** logo might be reproduced on the MMI to give the user the information that is registered on that network.



**NOTE:**

This command issues a network request and it may require quite a long time to respond, since the device has to wait the answer from the network (it can be as long as 60 seconds). Do not use this command if not necessary.

**2.4.3.3.**

**Check for Received Signal Strength & Quality**

Once the mobile has registered on one network, it may be useful to know the received signal strength & quality to give the user an indication of the reliability of the network.

send command **AT+CSQ<cr>**

wait for response in the format:

**<WCDMA network >**

**+CSQ: <rss>,99**

**OK**

**<GSM network>**

**+CSQ: <rss>,<ber>**

**OK**



where:

<rsssi> is an integer from 0 to 99 that indicates the received signal strength:

<rsssi> value	Signal Strength	Indication
0	-113 dBm or less	Signal is VERY low: at the extreme sensibility limit
1	-111 dBm	MMI may indicate only 1 antenna bar
2	-109 dBm	MMI may indicate only 1 antenna bar
3	-107 dBm	MMI may indicate only 1 antenna bar
4	-105 dBm	MMI may indicate only 1 antenna bar
5	-103 dBm	MMI may indicate only 1 antenna bar
6	-101 dBm	MMI may indicate 2 antenna bars
7	-99 dBm	MMI may indicate 2 antenna bars
8	-97 dBm	MMI may indicate 2 antenna bars
9	-95 dBm	MMI may indicate 2 antenna bars
10	-93 dBm	MMI may indicate 3 antenna bars
11	-91 dBm	MMI may indicate 3 antenna bars
12	-89 dBm	MMI may indicate 3 antenna bars
13	-87 dBm	MMI may indicate 3 antenna bars
14	-85 dBm	MMI may indicate 3 antenna bars
15	-83 dBm	MMI may indicate 4 antenna bars
16	-81 dBm	MMI may indicate 4 antenna bars
17	-79 dBm	MMI may indicate 4 antenna bars
18	-77 dBm	MMI may indicate 4 antenna bars
19	-75 dBm	MMI may indicate 4 antenna bars
20	-73 dBm	MMI may indicate 4 antenna bars
21	-71 dBm	MMI may indicate 4 antenna bars
22	-69 dBm	MMI may indicate 4 antenna bars
23	-67 dBm	MMI may indicate 4 antenna bars
24	-65 dBm	MMI may indicate 4 antenna bars
25	-63 dBm	MMI may indicate 4 antenna bars
26	-61 dBm	MMI may indicate 4 antenna bars
27	-59 dBm	MMI may indicate 4 antenna bars
28	-57 dBm	MMI may indicate 4 antenna bars
29	-55 dBm	MMI may indicate 4 antenna bars
30	-53 dBm	MMI may indicate 4 antenna bars
31	-51 dBm or more	MMI may indicate 4 antenna bars
99	not detected	MMI may indicate flashing antenna bars



**NOTE:**

When <rsssi> is less than 6, with only 1 MMI antenna bar, the quality of a call will be poor and the call may even drop.



<ber> is an integer from 0 to 7 and 99 that reports the received signal quality measured on the radio traffic channel.



**NOTE:**

The quality is measured on the traffic channel. It is available only during a conversation. In Idle the reported value must not be considered.

In conversation the quality decreases with the increase of the <ber> number.

**NOTE:**

The <ber> value refers strictly to the GSM radio channel and is a very technical parameter. It can be used to monitor the voice call quality since the voice quality is inversely proportional to the <ber> number. UC864-K doesn't support ber in WCDMA network so the return value fixed as 99.

**NOTE:**

For Data calls the signal quality reported is not directly connected to the connection quality. The reported signal quality refers only to the GSM radio channel link and not to the whole path from the caller to the receiver, so it may happen that the quality on the GSM radio link is very good and hence the reported <ber> is 0 (good quality) but the quality of the remaining path to the other party is very bad and the final data connection quality is very poor.

For this reason the signal quality indicator <ber> must not be taken into account to monitor data calls quality.

**2.4.3.4. Quick Network Status Checking**

Once the mobile has registered on one network, it may be useful to know the received signal strength and the network on which the mobile is registered. These information can be gathered with the commands **+CREG**, **+COPS** and **+CSQ**, which are part of the standard 3gpp GSM 07.07/27.007 commands as seen before, unfortunately these commands are not so fast in the response due to network response time, especially the **+COPS** command. If You want to keep your software as general as possible you can follow the indications given before and forget this part; instead if you need or want a faster way to check at the mobile network information, the UC864-K provides a special command **#MONI** which can be used to gather all the information needed in a faster and simpler way:

- send command **AT#MONI=0<cr>**
- wait for **OK** response
- send command **AT#MONI?<cr>**
- wait for response in the format:  
When extracting data for the serving cell and the network name is known the format is:

**(GSM network)**





- <uarfcn> - UMTS assigned radio channel
- <drx> - Discontinuous reception cycle length
- <scr> - Scrambling code

Note: TA: <timadv> is reported only for the serving cell.

When the last setting done is **AT#MONI=7**, then the Read command reports the above pieces of information for each of the cells in the neighbor of the serving cell, formatting them in a sequence of <CR><LF>-terminated strings. Currently this is available in case of GSM network.

For example (WCDMA):

at#moni=0<cr>

OK

At#moni<cr>

#MONI: Welcome to KTF PSC:270 RSCP:-76 Eclo:-3.5 UARFCN:10812  
PWR:-73 dBm DRX:64

OK

at#moni=1<cr>

OK

at#moni<cr>

#MONI: Sync NSet PSC:408 RSCP:-86 Eclo:-13.5 UARFCN:10812

#MONI: Sync NSet PSC:102 RSCP:-104 Eclo:-31.5 UARFCN:10812

OK

In this case the mobile is registered on the network whose Country code is 010 and Network operator code is 03, the signal strength is -83dBm (MMI may indicate 4 antenna bars as reported on the table 5). Other information received is strictly technical and must not be given to the user.

The values reported are random and have no meaning. They are used only to explain command usage.



**NOTE:**

This command must be used only to gather information on network name and signal strength, to check if mobile is registered or is looking for a suitable network to register. Always use the **+CREG** command. This is due to the fact that if the network signal is too weak and mobile loses the registration. Until a new network is found the **#MONI** command reports the last measured valid values and not the real ones.

The **TA** (timing advance parameter) is valid only during a call.



**TIP:**

To properly use this feature, check network registration with command **+CREG** as seen on par. 2.7.3.1 and when mobile is registered query the mobile for network operator name and signal strength with **#MONI** command.



## 2.5. Placing a Voice call

Before a voice call can be placed, it is recommended to check if the mobile is registered on a network (see par. 2.7.3.1) and if the signal strength is enough to ensure a call can be made.

### 2.5.1. Voice Call Device Setup

#### 2.5.1.1. Set the Device in Voice Mode

- send command **AT+FCLASS=8<cr>**
- wait for **OK** response



#### NOTE:

This command may be omitted if the modifier ";" is added at the end of the **ATD** command after the dialed number.

#### 2.5.1.2. Set the Desired Audio Path Active

The UC864-K has three different audio paths:

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

Usually the internal path is used for a handset function, while the external is used for handsfree function. There are two ways to switch between these two paths:

- SOFTWARE: by using the command **AT#CAP= <n>** (with n=1 OR n=2)
- HARDWARE: by setting **AT#CAP=0** and setting the AXE input high (internal MT) or low (external HF).

If only one path is needed, then it is preferable to use the internal one (MT).



#### TIP:

When Hardware control is not needed AXE pin can be left unconnected.

#### TIP:

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

- send command **AT#CAP=<n><cr>**

where:

**<n> = 0** for HARDWARE control with AXE input



- <n> = 1 for external HF path (regardless of the AXE input status)
- <n> = 2 for internal MT path (regardless of the AXE input status)
  - wait for **OK** response

For example:

1 - Let us assume that the desired audio path is always the internal MT command

**AT#CAP=2<cr>**

answer

**OK**

2 - Let us assume that the desired audio path has to be determined by HARDWARE pin AXE

command

**AT#CAP=0<cr>**

answer

**OK**

Now set the hardware pin AXE in the desired status.

Set the desired volume on the active audio path speaker output

This setting is not strictly necessary; it is also possible to keep the default volume setting.

- send command **AT+CLVL=<vol><cr>**

where:

<vol> is a number between 0 and 10 representing the volume setting:

0 - minimum volume

10 - maximum volume

- wait for **OK** response



**NOTE:**

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

**2.5.1.3. Check for Microphone Mute Setting**

The microphone of the active path can be muted with an AT command; to be sure that it is not muted, it is suggested to check it with this command

- Send command **AT+CMUT?<cr>**



- wait for response in the format:

**+CMUT: <mute>**

**OK**

where:

**<mute>** is the muting setting for the microphone:

0 - microphone active

1 - microphone muted



**NOTE:**

The mute setting is different from Volume setting: it refers to both the audio paths, the mute setting will remain even when changing audio path.

## 2.5.2. Phone Number Dialing

### 2.5.2.1. Dial a Given Phone Number

Send command **ATD <PhoneNumber><cr>**

where:

**<PhoneNumber>** is the phone number to be dialed

wait for response:

Response	Reason	Action
OK	The call has been placed	Wait for the other party to lift the receiver
BUSY	The line called is busy	retry later
NO ANSWER	The receiver did not answer the call	retry later
NO CARRIER	Call placing has not been successful	check for mobile registration and signal strength

For example:

1- Let us assume you have to call the national number 040 - 4192111,

commandó

**ATD 0404192111<cr>**

response

**OK**

2- Let us assume you have to call the national number but in international format

+39-40-4192111,

command



**ATD +39404192111<cr>**

response

**OK**

3- Let us assume you have to call the international number +386-40-4192111 without previously setting the +FCLASS=8 (voice),

command

**ATD +386404192111;<cr>**

response

**OK**

## 2.5.3. Closing the Voice Call

### 2.5.3.1. Hang up the Voice Call

- send command **AT+CHUP<cr>**
- wait for response **OK**



---

#### TIP:

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

---

## 2.6. Placing a Circuit Switched Data (CSD) call

Before a data call can be placed, it is recommended to check if the mobile is registered on a network (see par. 2.7.3.1) and if the signal strength is enough to ensure that a call can be made.

### 2.6.1. CSD Call Device Setup

#### 2.6.1.1. Set the Device in Data Mode

- send command **AT+FCLASS=0<cr>**
- wait for **OK** response



---

#### TIP:

The **+FCLASS** setting is maintained in the memory and there is no need to repeat this command if **+FCLASS** setting is not changed.

---



### 2.6.1.2. Set the Desired Modulation and Speed for the Connection

The data connection can be made using different modulations at different speeds. This connection mode can be selected with the command **+CBST**. The syntax for the command is: **AT+CBST=<mod>,0,<ce>**

These parameters can be selected as seen in the table:

#### <WCDMA network>

Command	Modulation	Speed [bps]	Connection Element
AT+CBST=0,0,1	V.32	9600	non transparent
AT+CBST=14,0,1	V.34	14400	non transparent
AT+CBST=16,0,1	V.34	28800	non transparent
AT+CBST=17,0,1	V.34	33600	non transparent
AT+CBST=43,0,1	V.120	14400	non transparent
AT+CBST=48,0,1	V.120	28800	non transparent
AT+CBST=51,0,1	V.120	56000	non transparent
AT+CBST=75,0,1	V.110/ X.31	14400	non transparent
AT+CBST=80,0,1	V.110 / X.31	28800	non transparent
AT+CBST=81,0,1	V.110 / X.31	38400	non transparent
AT+CBST=83,0,1	V.110/ X.31	56000	non transparent
AT+CBST=83,4,1	V.110/ X.31	56000 RDI	non transparent
AT+CBST=84,0,1	X.31	64000	non transparent
AT+CBST=116,1,0	Bit transparent	64000	transparent
AT+CBST=134,1,0	multimedia	64000	transparent

#### <GSM network>

Command	Modulation	Speed [bps]	Connection Element
AT+CBST=0,0,1	V.32	9600	non transparent
AT+CBST=7,0,1	V.32	9600	non transparent
AT+CBST=12,0,1	V.34	9600	non transparent
AT+CBST=14,0,1	V.34	14400	non transparent
AT+CBST=39,0,1	V.120	9600	non transparent
AT+CBST=43,0,1	V.120	14400	non transparent
AT+CBST=71,0,1	V110/ X.31	9600	non transparent
AT+CBST=75,0,1	V.110/ X.31	14400	non transparent
AT+CBST=7,0,0	V.32	9600	transparent
AT+CBST=12,0,0	V.34	9600	transparent
AT+CBST=14,0,0	V.34	14400	transparent

Once selected the appropriate **<mod >** and **<ce>** parameters from the table:

- send command **AT+CBST=<mod>,0,<ce><cr>**
- wait for **OK** response



## 2.6.2. Phone number dialing (data call)

### 2.6.2.1. Dial a Given Phone Number

- send command **ATD <PhoneNumber><cr>**
- **where:**
- **<PhoneNumber>** is the phone number to be dialed
- wait for response:

Response	Reason	Action
CONNECT 9600	The called modem is now on line.	exchange data
BUSY	The line called is busy	retry later
NO ANSWER	The receiver did not answer the call	retry later
NO CARRIER	The modem handshaking has not been successful	check for mobile registration and signal strength and eventually retry.



#### TIP:

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

#### TIP:

When the device is doing the handshake the issue of any character closing the handshake aborts the call.



For example:

1- Let us assume you have to call the national number 040 - 4192111,

command

**ATD 0404192111<cr>**

response

**CONNECT 9600**

2- Let us assume you have to call the national number but in international format +39-40-4192111,

command

**ATD +39404192111<cr>**

response

**CONNECT 9600**

3- Let us assume you have to call the international number +386-40-4192111,

command

**ATD +386404192111<cr>**

response

**CONNECT 9600**

## 2.6.3. Closing the Data call

### 2.6.3.1. Exit the data mode and enter the command mode

- send escape sequence **+++**
- wait for response **OK**

### 2.6.3.2. Hang up the data call

- send command **ATH<cr>**
- wait for response **NO CARRIER**



---

#### TIP:

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

---



## 2.7. Answer an incoming Call

When an incoming call is detected, the device reports an unsolicited code, which may be:

Unsolicited code	Reason
RING	The extended format of incoming call indication is disabled and a call (voice or data) is incoming.
+CRING: VOICE	The extended format of incoming call indication is enabled and a voice call is incoming.
+CRING: ASYNC	The extended format of incoming call indication is enabled and an asynchronous transparent data call is incoming.
+CRING: REL ASYNC	The extended format of incoming call indication is enabled and an asynchronous reliable (not transparent) data call is incoming.
+CRING: SYNC	The extended format of incoming call indication is enabled and a synchronous transparent data call is incoming.
+CRING: REL SYNC	The extended format of incoming call indication is enabled and a synchronous reliable (not transparent) data call is incoming.
+CRING: FAX	The extended format of incoming call indication is enabled and a fax call is incoming.

To answer the call:

- send command **ATA<cr>**
- wait for response:

Response	Reason	Action
CONNECT 9600	The incoming call was a DATA one and called modem is now on line.	exchange data
ERROR	No incoming call is found, call may have been lost	call lost
NO CARRIER	The incoming call was a DATA one and the modem handshaking has not been successful	check for mobile registration and signal strength and modem settings.
OK	The incoming call was a VOICE call and is now active.	proceed ahead



---

**TIP:**

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

---



### 3. Advanced Operations

#### 3.1. Accessing the Phonebook

The UC864-K can access the phonebook storage of the SIM card inserted, by using specific AT commands it is possible to store and recall phone numbers and their associated name.

##### 3.1.1. Preliminary Phonebook Setup

The UC864-K supports several SIM phonebook storages:

- “**DC**” - MT dialed calls list (+CPBW may not be applicable for this storage)
- “**EN**” - **SIM/USIM** (or **MT**) emergency number (+CPBW is not be applicable for this storage)
- “**FD**” - **SIM/USIM** fixed dialing-phonebook. If a SIM card is present or if a UICC with an active GSM application is present, the information in EF<sub>FDN</sub> under EF<sub>Telecom</sub> is selected. If a UICC with an active USIM application is present, the information in EF<sub>FDN</sub> under ADF<sub>USIM</sub> is selected.
- “**LD**” - SIM/UICC last-dialing-phonebook “**MC**” - MT missed(unanswered received) calls list (+CPBW may not be applicable for the storage) “**ME**” - MT phonebook
- “**ME**” - MT phonebook
- “**ON**” - **SIM(or MT)** own numbers (MSISDNs) list (reading of this storage may be available through +CNUM also). When storage information in the SIM/UICC, if a SIM card is present or if a UICC with an active USIM application is present, the information in EF<sub>MSISDN</sub> under DF<sub>Telecom</sub> is selected. If a UICC with an active USIM application is present, the information in EF<sub>MSISDN</sub> under ADF<sub>USIM</sub> is selected.
- “**RC**” - **MT** received-calls-list (+CPBW and +CPBF are not applicable for this storage)
- “**MC**” - device missed (unanswered received) calls list (+CPBF is not applicable for this storage)
- “**MB**” - mailbox numbers stored on SIM; it is possible to select this storage only if the mailbox service is provided by the SIM (see **#MBN**).

This is the list of the received calls calling numbers, it is updated automatically at each call received and insertion or search on it is not possible. The only operations allowed are recall, read and delete.

- “**SM**” - **SIM/UICC** phonebook. If a SIM card is present or if a UICC with an active GSM application is present, EF<sub>ADN</sub> under DF<sub>Telecom</sub> is selected. If a UICC with active USIM application is present, the global phonebook, DF<sub>PHONEBOOK</sub> under DF<sub>Telecom</sub> is selected.



In order to access the storage, you have to choose which one will be active. This must be always the first PB operation. Once the storage is selected, it is not needed anymore to select it again until the desired storage remains the one active and the device is not turned off.

### 3.1.1.1. Selecting PB Storage Active

- send command AT+CPBS=<storage>[<,password>]<cr>

where:

<storage> is the desired PB storage:

“DC” - MT dialed calls list (+CPBW may not be applicable for this storage)

“EN” - SIM/USIM (or MT) emergency number (+CPBW is not be applicable for this storage)

“FD” - SIM/USIM fixed dialing phonebook

“LD” - SIM/USIM last dialing phonebook

“MC” - missed calls list

“MB” - mailbox numbers stored on SIM

“ME” - MT phonebook

“ON” - SIM (or MT) own numbers (MSI storage may be available through +CNUM also).

“RC” - received calls list

“SM” - SIM/USIM phonebook

<password>: string type value representing the PIN2-code required when selecting PIN2-code locked <storage>s above, e.g. "FD" or the hidden key to be verified in order to access to the hidden phonebook entries in the SIM/USIM or any other phonebook with hidden entries.

- wait for response:

Response	Reason	Action
OK	selected PB is now active	Proceed ahead
ERROR	some error occurred	Enable extended result codes (see par. 2.7.2.1) and retry.
+CME ERROR: 10	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CMS ERROR: 310	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CME ERROR: 11	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)



+CMS ERROR: 311	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)
+CME ERROR: 12	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CMS ERROR: 316	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CME ERROR: 13	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.2
+CMS ERROR: 313	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.1
+CME ERROR: 14	SIM is busy	retry later
+CMS ERROR: 314	SIM is busy	retry later
+CME ERROR: 15	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).
+CMS ERROR: 315	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM)..
+CME ERROR: 17	PIN2 is required to continue operations, since FD facility is not enabled.	Enable FD facility with +CLCK (see par.3.1.1.2) and retry.



**NOTE:**

After power up & PIN authentication the device reads all the SIM for a backup, hence SIM access is inhibited (SIM is busy after the issue of the PIN or after power up if PIN request is disabled) for a time varying from few seconds to about a minute, depending on the percentage of written records in the SIM phonebook. If Phonebook commands are issued during this time the device returns an error message. If this happens, the operations will start again later.

**NOTE:**

Due to the particular features of the **FD** storage, when selecting the **FD** storage the PIN2 must be inserted or the **FD** facility must be enabled.

If **+CPBS** command reports **+CME ERROR: 17** then enable the facility with command **+CLCK** (see par. 3.1.1.2)

For example:

1- Let us assume you want to select the "SM" normal phonebook for operations,

command

**AT+CPBS="SM" <cr>**

response

**OK**



2- Let us assume you want to select the "MC" missed calls list for operations,  
command

**AT+CPBS="MC"<cr>**

response

**OK**

3. Let us assume you want to select the "FD" fixed dialing phonebook for operations  
command

**AT+CPBS="FD", "0000"<cr>**

response

**OK**

### 3.1.1.2. Enable Fixed Dialing Phonebook Facility (only for FD PB)

- send command **AT+CLCK=FD,1,<PIN2><cr>**

where:

**<PIN2>** is the PIN2 code of the SIM.

- wait for response:

Response	Reason	Action
OK	FD facility is now enabled	<b>Return to select PB (see par. 3.1.1.1)</b>
ERROR	some error occurred	Enable extended result codes (see par. 2.7.2.1), check if the PIN2 is correct and retry.
+CME ERROR: 16	the inserted PIN2 is wrong	Check PIN2 code and retry.



#### NOTE:

When receiving the ERROR or +CME ERROR message, repeat Query SIM presence and status since after 3 failed attempts SIM PIN2 is not requested anymore, SIM PUK2 is requested instead. You may need to go through procedure 2.7.2.4 (but insert PUK2 instead of PUK1)

### 3.1.2. Phonebook Entry Search by Name

First, you must select the "SM" storage as active (see par.3.1.1.1).

- send command **AT+CPBF=<text><cr>**

where:

**<text>** is the desired string to be found in the name field of the PB record.



- wait for response in the format:

**+CPBF= <index>,"<number>",<type>,"<text>"**

**OK**

where:

**<index>** is the record number on the PB;

**<Number>** is the phone number;

**<type>** is the type of number:

145 - international numbering scheme

129 - national numbering scheme

**<text>** is the alphanumeric name associated with the number or in the case no corresponding entries are found:

**+CME ERROR: 22** or simply **ERROR.**



**NOTE:**

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

For example:

1- Let us assume you want to select the "SM" normal phonebook for operations,  
command

**AT+CPBS="SM"<cr>**

response

**OK**

Now you might want to look for the entries with the name starting with: "FA"

command

**AT+CPBF="FA"<cr>**

the response may look like:

**+CPBF= 7,"+39404192369",145,"Fabio"**

**+CPBF= 9,"0404192111",129,"Fabrizio"**

**OK**

Now you might want to look for the entries with the name starting with: "FAUSTO" but no record contains this name:

command

**AT+CPBF="FAUSTO"<cr>**



response

**+CME ERROR: 22**

or if extended error codes are disabled simply

response

**ERROR**

### 3.1.3. Phonebook Entry Read by Index

First, you must select the desired storage as active (see par.3.1.1.1). Then:

- send command **AT+CPBR=<index>[,<index2>]<cr>**

where:

**<index>** is the index number of the desired PB record to be read.

- wait for response in the format:

**+CPBR= <index>,"<number>",<type>,"<text>"**

**OK**

where:

**<index>** is the record number on the PB;

**<Number>** is the phone number;

**<type>** is the type of number:

145 - international numbering scheme

129 - national numbering scheme

**<text>** is the alphanumeric name associated with the number or in the case the index number does not correspond to a written record:

**+CME ERROR: 22 or simply ERROR.**

For example:

1- Let us assume you want to select the "SM" normal phonebook for operations,

command

**AT+CPBS="SM"<cr>**

response

**OK**

Now you might want to look for the entry at the position index = 7

command

**AT+CPBR=7<cr>**

the response may look like



**+CPBR= 7,"+39404192369",145,"Fabio"**

**OK**

Now you might want to look for the entries at the positions from 7 to 9 and for example the position at index 8 is empty

command

**AT+CPBR=7,9<cr>**

the response may look like

**+CPBR= 7,"+39404192369",145,"Fabio"**

**+CPBR= 9,"0404192111",129,"Fabrizio"**

**OK**

### 3.1.4. Phonebook Entry Write

First you must select the desired storage as active (see par.3.1.1.1). Then:

- send command **AT+CPBW=<index>,<number>,<type>,<text><cr>**

where:

**<index>** is the index number of the desired PB record to be written (may be omitted if any empty record number can be used).

**<Number>** is the phone number;

**<type>** is the type of number:

145 - international numbering scheme (contains the character "+")

129 - national numbering scheme

**<text>** is the alphanumeric name associated with the number.

- wait for response:

Response	Reason	Action
OK	Record has been successfully written	Proceed ahead
ERROR	some error occurred	Enable extended result codes (see par. 2.7.2.1), and retry.
+CME ERROR: 10	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CMS ERROR: 310	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CME ERROR: 11	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)



+CMS ERROR: 311	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)
+CME ERROR: 12	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CMS ERROR: 316	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CME ERROR: 13	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.2
+CMS ERROR: 313	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.3
+CME ERROR: 14	SIM is busy	retry later
+CMS ERROR: 314	SIM is busy	retry later
+CME ERROR: 15	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).
+CMS ERROR: 315	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).
+CME ERROR: 21	invalid index	Change index number or leave it empty and retry.
+CME ERROR: 20	memory full	PB storage is full.
+CMS ERROR: 322	memory full	PB storage is full.

For example:

1- Let us assume you want to select the "SM" normal phonebook for operations,  
command

**AT+CPBS="SM"<cr>**

response

**OK**

Now you might want to write a new record on the PB:

command

**AT+CPBW=,"0404192123",129,"NewRecord"<cr>**

response

**OK**

Now you may want to check if the operation has really succeeded and where the new record has been written (obviously the operation was successful, since the device returned OK).

command

**AT+CPBF="NEW"<cr>**

response

**+CPBF= 8,"0404192123",129,"NewRecord"**



OK

The new record was written at the position index 8. (The first free record index found).

### 3.1.5. Phonebook Entry Delete

Fisrt, the desired storage must be active (see par.3.1.1.1). Then:

- send command **AT+CPBW=<index><cr>**

where:

**<index>** is the index number of the desired PB record to be deleted.

- wait for response:

Response	Reason	Action
OK	Record has been successfully deleted	proceed ahead
ERROR	some error occurred	Enable extended result codes (see par. 2.7.2.1), and retry.
+CME ERROR: 21	invalid index, out of PB storage limits	check index number and retry.
+CME ERROR: 10	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CMS ERROR: 310	SIM not present	Check SIM or require SIM insertion and repeat from par. 2.7.2.2
+CME ERROR: 11	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)
+CMS ERROR: 311	SIM is present and PIN is required to continue operations	insert SIM PIN (see par. 2.7.2.3)
+CME ERROR: 12	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CMS ERROR: 316	SIM is present and PUK is required to continue operations	insert SIM PUK (see par. 2.7.2.4)
+CME ERROR: 13	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.2
+CMS ERROR: 313	SIM defect	Check SIM insertion or require a new SIM not defected and repeat from par. 2.7.2.3
+CME ERROR: 14	SIM is busy	retry later
+CMS ERROR: 314	SIM is busy	retry later
+CME ERROR: 15	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).



+CMS ERROR: 315	SIM is wrong type	Check SIM, it must be a GSM SIM or UMTS SIM(USIM).
-----------------	-------------------	--



**TIP:**

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

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

### 3.1.6. Phonebook Entry Dial

You may want to dial a number previously stored in the phonebook. First, you must find the desired phone number index position, to do it use **the +CPBF** command. Once the <index> number is known, set up the device for the type of call you want to dial. Then:

- send command **ATD> <index><cr>**

where:

<index> is the index number of the desired PB record to be dialed.

- wait for response according to the call type you issued.

For example:

1- Let us assume you want to make a Voice call on the internal audio path MT to "Fabio" whose number is stored on the SIM PB:

- Select the PB as active storage

command

**AT+CPBS="SM"<cr>**

response

**OK**

Now find the index number where "Fabio" is recorded:

command

**AT+CPBF="Fabio"<cr>**

the response may look like

**+CPBF= 7, "+39404192369",145,"Fabio"**

**OK**

the first field is the index position: 7 in this case.

Now set up Voice call:



```

command
AT+FCLASS=8<cr>

response:
OK
AT#CAP=2 <cr>
OK
AT+CLVL=8<cr>
OK
AT+CMUT? <cr>
+CMUT: 0

and dial
ATD> 7<cr>
OK
  
```

## 3.2. Distinguish Calls

### 3.2.1. Identify the Call Type

The UC864-K is able to identify the call type before answering it. It is possible to have different ring indications (unsolicited codes) depending on the call type:

Unsolicited code	Reason
RING	The extended format of incoming call indication is disabled and a call (voice or data) is incoming.
+CRING: VOICE	The extended format of incoming call indication is enabled and a voice call is incoming.
+CRING: ASYNC	The extended format of incoming call indication is enabled and an asynchronous transparent data call is incoming.
+CRING: SYNC	The extended format of incoming call indication is enabled and a synchronous transparent data call is incoming.
+CRING: REL ASYNC	The extended format of incoming call indication is enabled and an asynchronous not transparent data call is incoming.
+CRING: REL SYNC	The extended format of incoming call indication is enabled and a synchronous not transparent data call is incoming.
+CRING: FAX	The extended format of incoming call indication is enabled and a fax call is incoming.

In order to use this feature you must enable the extended format of incoming calls



### 3.2.1.1. Set the Extended Incoming Call Indication

- send command **AT+CRC=<n><cr>**

where:

<n> is the operation mode selected:

0 - extended results Disabled (device reports RING only)

1 - extended results Enabled (device reports +CRING: <type> indication)

- wait for **OK** response

### 3.2.2. Identify the Caller

The UC864-K is able to identify the caller number and give indication of it before the call is answered. The calling number is presented after each **RING** or **+CRING** indication in the format:

**+CLIP: "<number>",<type>["<subaddress>",<satype>["<alpha>"],["<CLI validity>"]]]**

**OK**

where:

<Number> is the phone number;

<type> is the type of number:

145 - international numbering scheme

129 - national numbering scheme

<subaddress> is the subaddress of the calling party

<satype> is the type of subaddress

<alpha> is an optional string type alphanumeric representation of <number> corresponding to the entry found in phonebook;

<CLI validity> is the validity status of CLI presentation:

0 CLI valid.

1 CLI has been withheld by the originator.

2 CLI is not available due to interworking problems or limitation or originating network.

In order to use this feature you must enable the caller ID indication presentation, if feature is disabled then no **CLI** indication is given after the **RING** or **+CRING** code.

### 3.2.2.1. Set Caller line ID Indication Presentation

- send command **AT+CLIP=<n><cr>**

where:



<n> is the operation mode selected:

0 - Calling Line Indication Presentation Disabled

1 - Calling Line Indication Presentation Enabled

- wait for **OK** response

For example:

1- Let us assume you receive a call from the national number 1234567890 and extended incoming calls indication is disabled while CLIP is enabled, you can see:

**ring indication:**

**RING**

**+CLIP: "1234567890", 129**

2- Let us assume you receive a call from the international number +391234567890 and extended incoming calls indication is disabled while CLIP is enabled, you can see:

**ring indication:**

**RING**

**+CLIP: "+391234567890", 145**



**NOTE:**

This does not mean that the incoming call is an international one, it simply means that the numbering scheme used to identify the caller is international.

### 3.2.3. Restricting Calling Line Indication

The UC864-K is able to send the calling line indication (CLI) to the other party through the network when an outgoing call is made. This indication can be restricted (CLIR) in various ways:

- CLI sent always
- CLI never sent
- CLI temporary sent (normally not sent)
- CLI temporary not sent (normally sent)

#### 3.2.3.1. CLIR Service Status Query

- send command **AT+CLIR?<cr>**
- wait for response in the format: **+CLIR: <n>,<m>**

**OK**

where:

<n> is the facility status on the Mobile



- 0 - CLIR facility according to CLIR service network status
  - 1 - CLIR facility active (CLI not sent)
  - 2 - CLIR facility not active (CLI sent)
- <m> is the facility status on the Network
- 0 - CLIR service not provisioned (service unavailable)
  - 1 - CLIR service provisioned (service available)
  - 2 - unknown (e.g. no network present, etc.)
  - 3 - CLI temporary mode presentation restricted
  - 4 - CLI temporary mode presentation allowed



**NOTE:**

The <m> parameter reports the status of the service at network level.

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

For example:

1- Let us assume you want to check your CLIR settings:

command

**AT+CLIR? <cr>**

response

**+CLIR: 2,4**

In this case the CLIR service is temporary mode allowed on the network and the mobile sends the CLI when calling. (CLI Restriction not active).

**3.2.3.2. Restrict/Allow Caller Line ID Indication**

- send command AT+CLIR=<n><cr>

where:

<n> is the operation mode selected:

- 0 - Calling Line Indication to the other party According to Network service status.
- 1 - Calling Line Indication Restriction Enabled (CLI not sent)
- 2 - Calling Line Indication Restriction Disabled (CLI sent)

- wait for **OK** response

For example:



1- Let us assume you want to disable the CLI presentation to the other party permanently:

command

**AT+CLIR=1<cr>**

response:

**OK**

### 3.2.4. Call Barring Control

Call barring is a GSM/WCDMA service that allows the user to block certain types of calls:

- barring all outgoing calls
- barring outgoing International calls
- barring outgoing International calls except to home country
- barring all incoming calls
- barring incoming calls when roaming outside the home country
- all barring services (applicable only for disabling command)
- all outgoing barring services (applicable only for disabling command)
- all incoming barring services (applicable only for disabling command)

The service can be queried, enabled and disabled.



#### NOTE:

The call barring service is handled by the network, hence all the relative commands issue a network request and it may take several seconds to get response from the network.

Furthermore, all call barring service commands must be issued when the mobile is registered on some Network, otherwise an error code is returned (no network service).

#### 3.2.4.1. Call Barring Service Status Query

- send command **AT+CLCK=<fac>,2<cr>**

where:

**<fac>** is the facility to be queried:

**AO** - Barring All Outgoing Calls

**OI** - Barring Outgoing International Calls

**OX** - Barring Outgoing International Calls except to Home Country



**AI** - Barring All Incoming Calls

**IR** - Barring Incoming Calls when Roaming outside the home country

**AB** - All barring services (applicable only for disabling command)

**AG** - All outgoing barring services (applicable only for disabling command)

**AC** - All Incoming barring services (applicable only for disabling command)

**PP** - service Provider Personalization (refer 3GPP TS 22.022 [33])

**PC** - Corporate Personalization (refer 3GPP TS 22.022 [33])

**PF** - lock Phone to the very First inserted SIM/UICC card (also referred in the present document as PH-FSIM) (MT asks password when other than the first SIM/UICC card is inserted)

- wait for response:

Response	Reason	Action
+CLCK: 0	facility is disabled	calls are allowed
+CLCK: 1	facility is enabled	calls are barred
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax and service code
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.



**NOTE:**

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

Furthermore all the Barring service commands must be issued when the mobile is registered on some network, else an error code is returned (no network service ).

For example:

1- Let us assume you want to check whether the incoming calls when roaming outside Home Country are barred or not:

command

**AT+CLCK=IR,2<cr>**

response

**+CLCK: 0**

In this case, the incoming (received) calls ARE NOT BARRED when in Roaming outside the Home Country.

2- Let us assume you want to check whether the Outgoing (originated) international calls are barred or not:



command

**AT+CLCK=OI,2<cr>**

response:

**+CLCK: 1**

In this case, the outgoing international calls ARE BARRED.

### 3.2.4.2. Barring/Unbarring All Incoming Calls

- send command **AT+CLCK=AI,<en>,<pwd><cr>**

where:

**<en>** is the operation selected:

0 - Call Barring Disable (Unbarring)

1 - Call Barring Enable (Barring)

**<pwd>** is the network password required to change facility status

- wait for response:

Response	Reason	Action
OK	Barring is now enabled/disabled	all incoming calls will be barred/unbarred
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry

For example:

1- Let us assume you want to bar all the incoming calls and the network password of your operator is 0000:

command

**AT+CLCK=AI,1,0000<cr>**

response

**OK**



### 3.2.4.3. Barring/Unbarring Incoming Calls When in International Roaming

- send command **AT+CLCK=IR,<en>,<pwd><cr>**

where:

**<en>** is the operation selected:

0 - Call Barring Disable (Unbarring)

1 - Call Barring Enable (Barring)

**<pwd>** is the network password required to change facility status

- wait for response:

Response	Reason	Action
OK	Barring is now enabled/disabled	all incoming calls when is international Roaming will be barred/unbarred
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry

For example:

1- Let us assume you want to bar all the incoming calls when the mobile is roaming outside its home country and the network password of your operator is 0000:

command

**AT+CLCK=IR,1,0000<cr>**

response

**OK**

### 3.2.4.4. Barring/Unbarring All Outgoing Calls

- send command **AT+CLCK=AO,<en>,<pwd><cr>**

where:

**<en>** is the operation selected:

0 - Call Barring Disable (Unbarring)

1 - Call Barring Enable (Barring)

**<pwd>** is the network password required to change facility status

- wait for response:



Response	Reason	Action
OK	Barring is now enabled/disabled	all outgoing calls will be barred/unbarred
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry

For example:

1- Let us assume you want to bar all the outgoing calls (originated by mobile) and the network password of your operator is 0000:

command

**AT+CLCK=AO,1,0000<cr>**

response

**OK**

### 3.2.4.5. Barring/Unbarring All Outgoing International Calls

- send command **AT+CLCK=OI,<en>,<pwd><cr>**

where:

**<en>** is the operation selected:

0 - Call Barring Disable (Unbarring)

1 - Call Barring Enable (Barring)

**<pwd>** is the network password required to change facility status

- wait for response:

Response	Reason	Action
OK	Barring is now enabled/disabled	all outgoing international calls will be barred/unbarred
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry



For example:

1- Let us assume you want to bar all the outgoing international calls (originated by mobile and to a number outside the home country of the mobile) and the network password of your operator is 1234:

command

**AT+CLCK=OI,1,1234<cr>**

response:

**OK**

### 3.2.4.6. Barring/Unbarring All Outgoing International Calls Except to Home Country

- send command **AT+CLCK=OX,<en>,<pwd><cr>**

where:

**<en>** is the operation selected:

0 - Call Barring Disable (Unbarring)

1 - Call Barring Enable (Barring)

**<pwd>** is the network password required to change facility status

- wait for response:

Response	Reason	Action
OK	Barring is now enabled/disabled	all outgoing international calls except to Home Country will be barred/unbarred
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry

For example:

1- Let us assume you want to bar all the outgoing international calls except the ones towards the Home Country and the network password of your operator is 1234:



command

**AT+CLCK=OX,1,1234<cr>**

response:

**OK**

### 3.2.4.7. Unbarring all the Calls

- send command **AT+CLCK=AB,0,<pwd><cr>**

where:

**<pwd>** is the network password required to change facility status

- wait for response:

Response	Reason	Action
OK	Barring is now disabled	all calls will be allowed (unbarring)
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CME ERROR: 4	operation not supported, the service required is not available	Check command syntax
+CME ERROR: 30	no network service	Check for registration (see par. 2.7.3.1) and signal strength.
+CME ERROR: 16	wrong network password	check network password and retry

For example:

1- Let us assume you want to disable all the barring services you might have previously activated and the network password of your operator is 0000:

command

**AT+CLCK=AB,0,0000<cr>**

response:

**OK**



### 3.3. DTMF Tones

DTMF tones are managed by specific AT commands. These tones are generated with AT commands only during voice calls. The minimum duration of a DTMF tone can be set on 10 ms but it must be considered that this value can vary with the limitations of the network.

Group low	Group high		
	1209 Hz	1336 Hz	1477 Hz
697 Hz	1	2	3
770 Hz	4	5	6
852 Hz	7	8	9
941 Hz	*	0	#



**NOTE:**

The GSM/WCDMA system architecture defines that the audio signal of the DTMF tones is inserted by the network switches on commands sent by the Mobile Station (MS). Thus, the default duration parameters may vary from network to network. In case that the devices are controlled by DTMF, they become sensitive related to the duration of the tones and timing of the sequences. Dedicated investigations on the parameter settings must be made.

### 3.4. GSM/WCDMA Power Saving Function

The Telit UC864-K has a special function that reduces power consumption during idle time, thus allowing a longer standby time with a given battery capacity.

This function monitors the DTR line and USB VBUS line indicating that the OEM application is ready to send commands when DTR goes high (3V on UART) and USB VBUS goes low (0V on USB). If so, the OEM application is not going to send any commands and the UC864-K module can save energy by shutting down its internal serial port or USB port.

When the OEM application becomes ready again, the line DTR is tied low (0V on UART) or VBUS is tied high (5V on UART); the UC864-K detect this condition and powers up the serial port or USB port.

If the power saving function is activated, then the serial port must support the DTR line since when this line is high (Data Terminal is NOT ready) and the USB port must support the VBUS line since when this line is Low the device goes into a sleep condition and will not respond to commands until the DTR is tied low (Data Terminal is ready) or the VBUS is tied high.





**NOTE:**

To turn OFF UC864-E, first, OEM application MUST cut off supplying power to the USB\_VBUS pin, then the pad ON# must be tied low for at least 2 seconds and then released.

**3.4.1.1. Enabling/Disabling the Power Saving Function**

- send command **AT+CFUN=<fun><cr>**

where:

**<fun>** is the power saving function mode, the supported values are:

0 - minimum functionality, NON-CYCLIC SLEEP mode: in this mode, the AT interface is not accessible.

1 - mobile full functionality with power saving disabled (factory default)

2 - disable TX

4 - disable both TX and RX

5 - mobile full functionality with power saving enabled

- wait for response:

Response	Reason	Action
OK	The power save is now active	
ERROR	some error occurred	Enable extended result codes (see par. 2.7.2.1), and retry.
+CME ERROR: 4	operation not supported	Check command syntax and <fun> value.

**3.5. Power Saving Mode**

Power Saving Mode means that Device is in sleep mode with disabling the interface (UART/USB).

UC864 family makes it possible for DTE to receive the event such as incoming call/SMS/data while both DTE and Modem are in sleep mode with disabling all serial interfaces.

DTE must require below specification to achieve the reduction of power consumption.

- DSR/DTR/RTS/CTS/RI Pin control on Main UART port.
- DSR/DTR/RTS/CTS Pin emulation on Telit USB Modem port.

If DTE satisfies above requirement, UC864 family can provide the functionalities:

- Keep URC message.



- Keep Incoming data during data mode, until DTE wake up from sleep mode.
- UC864 Family help DTE to reduce their power consumption using below rules.
- Use RI on Main UART to wake up DTE from sleep mode. (DTE must always monitor RI pin during power saving mode).
- Use DTR on Main UART to place Modem in sleep mode or wake up Modem from sleep mode.
- Use RTS on Main UART to control the flow from Modem to DTE. (Hardware flow control(+IFC=2,2) must be used in power saving mode).



---

**NOTE:**

UC864-E version cannot be put in saving mode if USB\_VBUS is connected, first of all, you MUST cut off supplying power to the USB\_VBUS, or the module does not go in power saving mode.

---



### 3.5.1.1. URC Message in Power Saving Mode

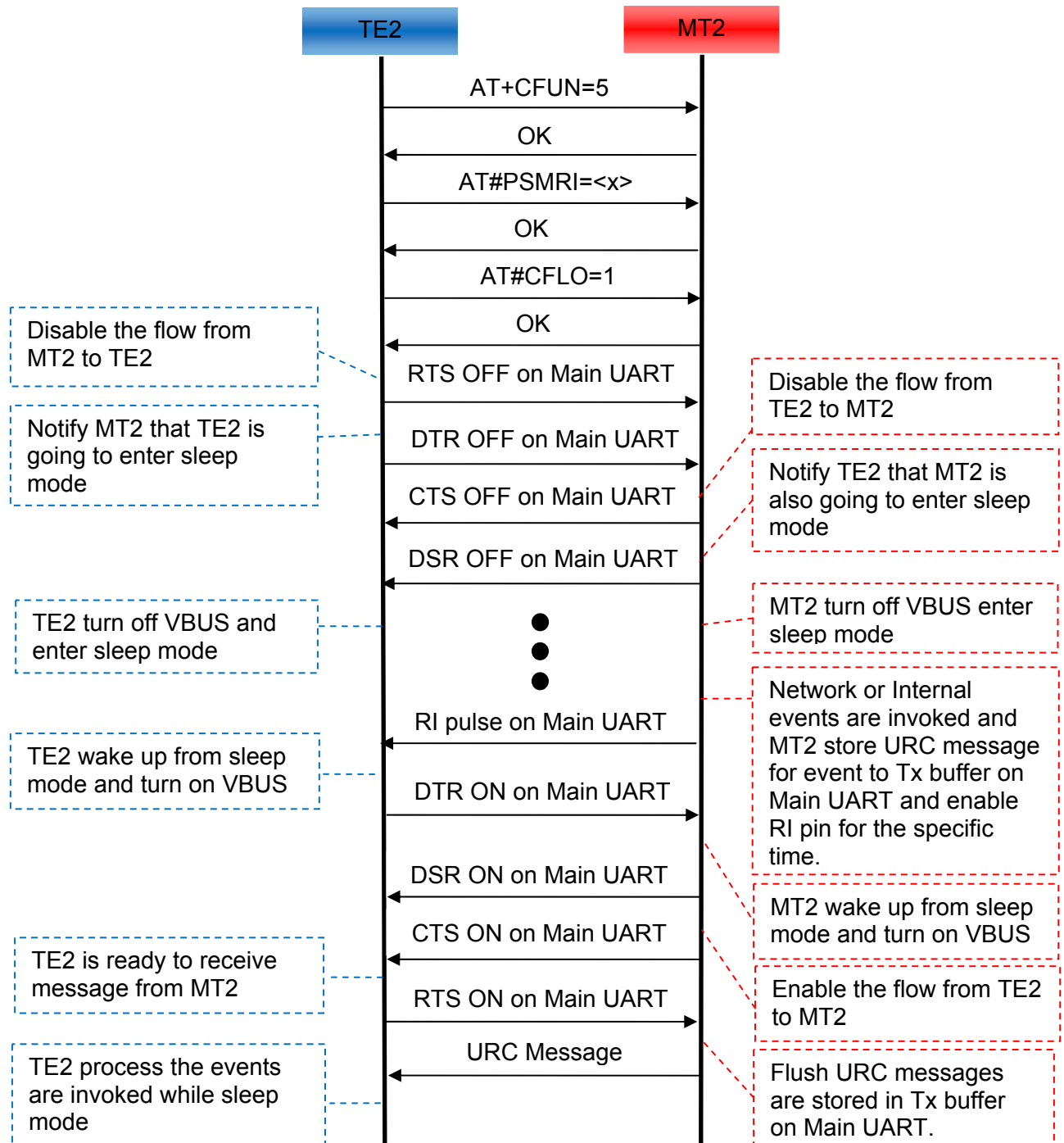


Figure 3.1-1 The flow chart for URC message in power saving mode



Above Figure3.1-1 illustrates the action flow to get URC message are invoked while both DTE and modem in sleep mode. UC864 Family offers below serial ports, which have their own the limitation for flow control methods.

**Table 3.1-1 the flow control capability for each serial interface**

Flow Control Method	Hardware Flow	Software Flow
Main UART	Support	Support
Telit USB Modem	Support(only for data mode)	Not Support
Telit USB Auxiliary	Not Support	Not Support

UC864-K keep the URC messages are listed in Table 3.1-1 and enabled by AT command in power saving mode.

**Table 3.1-2 URC message List**

URC Message	Enable/Disable AT Command
RING	Not Support , Always enabled
NO CARRIER	Not Support , Always enabled
CONNECT	Not Support , Always enabled
+CIEV	+CIND
+CREG	+CREG
+CGREG	+CGREG
+CMTI,+CMT,+CBM,+CDS,+CDSI	+CNMI
+CCWA	+CCWA
#TEMPMEAS	#TEMPMON
#MWI	#MWI
#GSMAS	#GSMAD
+SRING	Not Support , Always enabled
+CRING	+CRC
+CLIP	+CLIP
+CUSD	+CUSD
+CCM	+CAOC
+CSSI,+CSSU	+CSSN
+CALA	+CALA
#QSS	#QSS
#ECAM	#ECAM

UC864-K keep the URC messages are listed in Table 3.1-1 and enabled by AT command in power saving mode.

**Table 3.1-3 VBUS Control System**

Product	VBUS Master
UC864-E	DTE ( must turn off VBUS when entering to sleep mode and turn on VBUS when waking up from sleep mode )
UC864-G/WD/WDU	Modem ( turn off VBUS when entering to sleep mode and turn on VBUS when waking up from sleep mode, automatically)

Note : DTE can get URC message using only Main UART in power saving mode. If Main UART is reserved for data communication, it's impossible to get URC messages are invoked during power saving mode. UC864 Family can't keep URC messages larger than 8K bytes, when hardware flow control is activated by



RTS(AT#CFLO=1). we recommend that DTE get the URC message as soon as RI signal is guaranteed on Main UART.

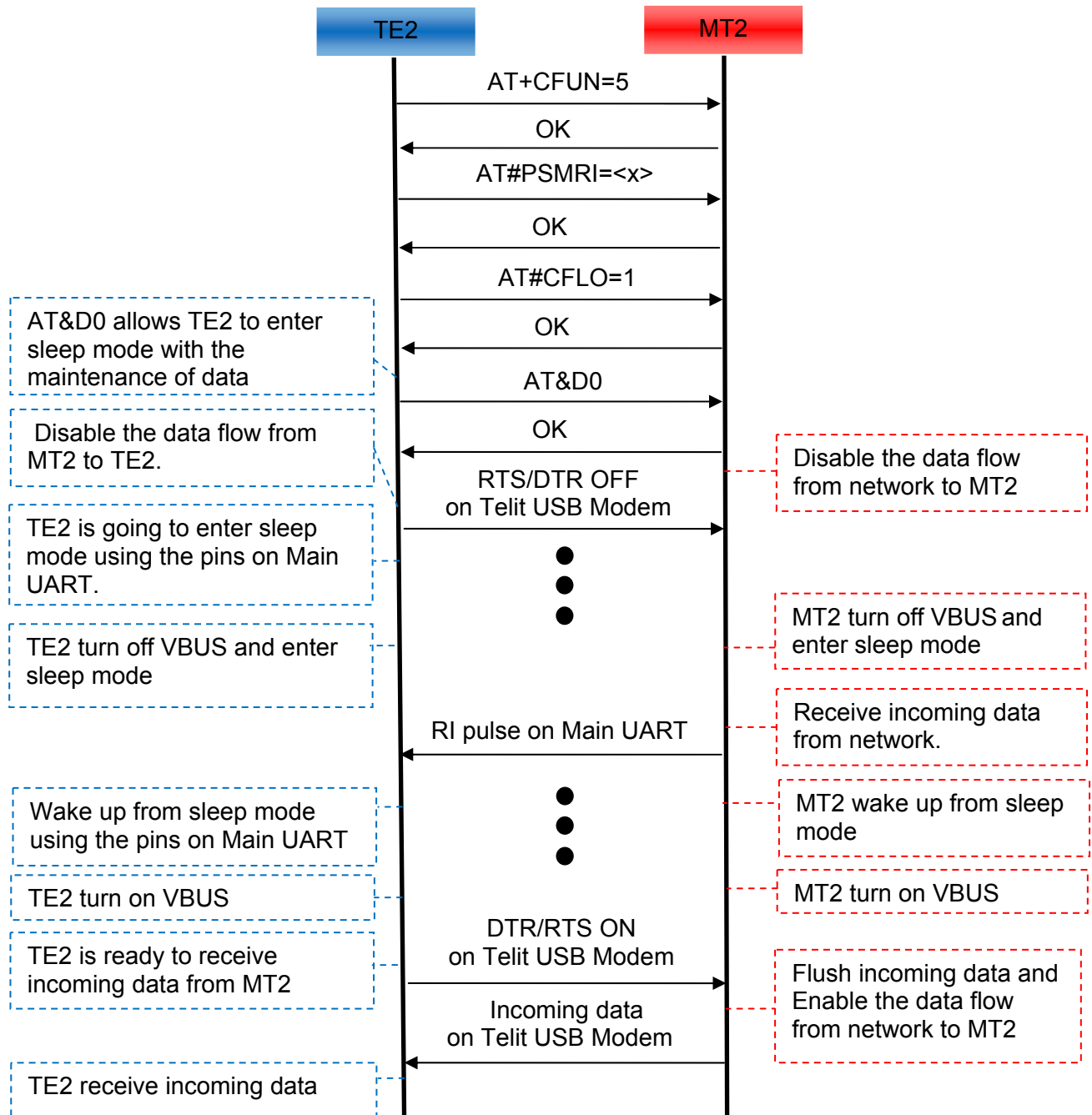


Figure 3.2-1 The flow chart for incoming data in power saving mode



UC864-K provides the option to allow DTE to enter sleep mode with the maintenance of data connection.

Above Figure 3.2-1 illustrates the action flow to achieve this purpose.



**NOTE:**

This option is applied only to PS Data Service. (not support for the service such as CS Data and FAX).

**NOTE:**

We recommend that DTE must wake up from sleep mode and get incoming data as soon as possible. Network operators have their own inactivation timer for data transmission.

If DTE doesn't wake up from sleep mode even though RI signal is activated, the data connection may be disconnected by network.

### 3.5.2. RI Signal for the Specific Event

DTE can wake up from sleep mode by monitoring RI pin, while it's in sleep mode. UC864 Family provides different RI signal type to DTE, according to the specific event.

This paragraph deals with the following items:

- RI Signal for incoming call
- RI Signal for incoming SMS
- RI Signal for socket listen during server mode
- RI Signal for URC message and incoming data during power saving mode



### 3.5.2.1. RI Signal for Incoming Call

RI signal for incoming call has different signal in accordance with the value of \R and RING message is sent to DTE the instance RI signal is going to is activated, periodically.

In case the value of \R is 0 or 1, RI signal and RING message like as figure 3.3.1-1 is generated.

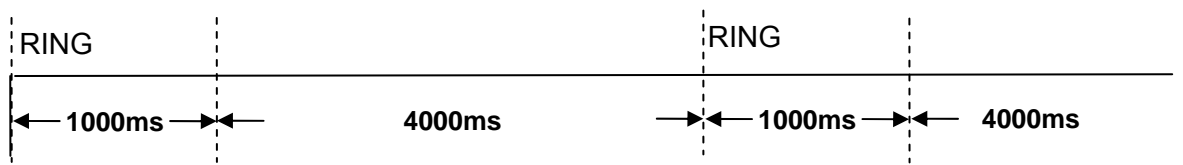


Figure 3.3.1-1 RI signal for \R0 or \R1

In case the value of \R is 2, RI signal and RING message is generated like as Figure 3.3.1-2.



Figure 3.3.1-2 RI signal for \R2

### 3.5.2.2. RI Signal for Incoming SMS

RI signal for incoming SMS has two types in accordance with the value of +CNMI or #E2SMSRI. In case +CNMI=3,1, the negative going pulse like as figure 3.3.2-1 is generated, one time.



Figure 3.3.2-1 RI Signal for +CNMI=3,1

In case #E2SMSRI = <x>, the negative going pulse like as figure 3.3.2.-2 is generated, one time.





Figure 3.3.2-2 RI Signal for #E2SMSRI

Note: In case both +CNMI=3,1 and #E2SMSRI=<x> is issued, RI signal behavior by #E2SMSRI is ignored by +CNMI

### 3.5.2.3. RI Signal for Socket Listen

RI Signal is generated, when modem receive TCP connection request from remote client during socket server mode. This signal is the negative going pulse and is generated, one time.



Figure 3.3.3-1 RI Signal for #E2SLRI

### 3.5.2.4. RI Signal for Events in Power Saving Mode

RI Signal for URC message and incoming data is generated, only when modem is in power saving mode. #PSMRI must be set as the value is not 0 and AT#CFLO=1 must be issued. DTE issue AT+CFUN=5 and Drop DTR pin on main UART to place modem in the power saving mode.



Figure 3.3.4-1 RI Signal for #PSMRI

Note: if RI signal for Incoming Call, SMS, Socket Listen and #PSMRI are generated at the same time in power saving mode, RI signal for #PSMRI will be ignored.



## 3.6. SMS Handling

The Telit UC864-K supports the Short Message Service, it is possible to store, delete, write, send and receive a SMS, which is a short text message up to 160 characters long.

### 3.6.1. SMS Device setup

Before accessing the Short Message Service, the device has to be properly set up.

#### 3.6.1.1. Select SMS Format Type

The UC864-K supports SMS in two different formats:

- PDU
- Text

The difference is that in the PDU mode the device returns and receives SMS encoded in the format ready to be sent to the network; in TEXT mode the device converts automatically the read PDU into text and vice versa. By using TEXT mode, the PDU data encoding knowledge is not needed and operations are easier. For this reason, we are using the TEXT mode to explain how to operate with SMS. If you are familiar with PDU encoding then you can operate with PDU by selecting that format and using appropriate command syntax.

- Send command **AT+CMGF=<mode><cr>**

where:

**<mode>** is the SMS format type:

0 - PDU

1 - Text

- wait for response **OK**




---

#### TIP:

- This setting is stored and remains until the device is turned off. Hence, there is no need to issue it more than one time. For TEXT mode use <mode>=1.
  - Should be used the PDU mode for local network operator specification support
- 

For example:

1- Let us assume you want to set TEXT format for the SMS:

command

**AT+CMGF=1<cr>**

response:



OK

### 3.6.1.2. Check SMS Service Centre Number

The SMS are sent by the UC864-K to a service centre (SMSC) where the message is dispatched towards its final destination or is kept until the delivery is possible. To ensure a correct behavior of this service the number of the service centre must be the one your network operator supports.

To check which number is stored as the SMSC:

- send command **AT+CSCA?<cr>**
- wait for response in the format: **+CSCA: <number>,<type>**

OK

where:

**<number>** is the SMSC number

**<type>** is the SMSC number type:

145 - international numbering scheme (number begins with "+")

129 - national numbering scheme



#### TIP:

This settings stored by +CSAS command and restored by +CRES command.

And EFsmsp first (or only) record in the EF shall be used as a default set of parameters, if no other record is selected (+CRES). The setting is maintained even after power down.

For example:

1- Let us assume you want to check your SMSC number:

command

**AT+CSCA? <cr>**

response:

**+CSCA: +393359609600**

OK

### 3.6.1.3. Add SMS Service Centre Number (only if required)

If your previously check for SMSC returned an empty field:

**+CSCA: ,129**

Or if the SMSC number stored does not correspond to the desired one, then the new number has to be stored. In this way, the previously stored number will be overwritten.



- send command **AT+CSCA=<number>,<type><cr>**

where:

**<number>** is the desired SMSC number

**<type>** is the SMSC number type:

145 - international numbering scheme (number begins with "+")

129 - national numbering scheme

- wait for **OK**

For example:

1- Let us assume your desired SMSC number is +39335123456 (stored in international format):

command

**AT+CSCA=+39335123456,145<cr>**

response:

**OK**

#### 3.6.1.4. Select New Messages Indication Behavior

When the device receives a new message a unsolicited indication is generated, this indication may be sent to the DTE, buffered if the DTE is busy (for example during a data call) or discarded.

To set the desired behavior:

- send command **AT+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr><cr>**

where:

Set command selects the behaviour of the device on how the receiving of new messages from the network is indicated to the DTE.

Parameter:

**<mode>** - unsolicited result codes buffering option

0 - Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.

1 - Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved, otherwise forward them directly to the TE.

2 - Buffer unsolicited result codes in the TA in case the DTE is busy and flush them to the TE after reservation. Otherwise forward them directly to the TE.



3 - if **<mt>** is set to 1 an indication via 100 ms break is issued when a SMS is received while the module is in GPRS online mode. It enables the hardware ring line for 1 s. too.

**<mt>** - result code indication reporting for SMS-DELIVER

0 - No SMS-DELIVER indications are routed to the TE.

1 - If SMS-DELIVER is stored into ME/TA, indication of the memory location is routed to the TE using the following unsolicited result code:

**+CMTI: <memr>,<index>**

where:

**<memr>** - memory storage where the new message is stored

"SM"

"ME"

"SR"

**<index>** - location on the memory where SM is stored.

2 - SMS-DELIVERs (except class 2 messages and messages in the message waiting indication group) are routed directly to the TE using the following unsolicited result code:

**(PDU Mode)**

**+CMT: <alpha>,<length><CR><LF><pdu>**

where:

**<alpha>** - alphanumeric representation of originator/destination number corresponding to the entry found in MT phonebook

**<length>** - PDU length

**<pdu>** - PDU message

(TEXT Mode)

**+CMT:<oa>,<alpha>,<scts>[,<tooa>,<fo>,<pid>,<dcsc>,<sca>,<tosca>,<length>]<CR><LF><data>** (the information written in italics will be present depending on +CSDH last setting)

where:

**<oa>** - originating address, string type converted in the currently selected character set (see +CSCS)

**<alpha>** - alphanumeric representation of <oa>; used character set must be the one selected with either command +CSCS.

**<scts>** - arrival time of the message to the SC

**<tooa> , <tosca>** - type of number **<oa>** or **<sca>**:

129 - number in national format



145 - number in international format (**contains the "+"**)

<fo> - first octet of 3gpp 03.40/23.040

<pid> - Protocol Identifier

<dcs> - Data Coding Scheme

<sca> - Service Centre address, string type, converted in the currently selected character set (see +CSCS)

<length> - text length

<data> - TP-User-Data

Class 2 messages and messages in the message waiting indication group (stored message) result in indication as defined in <mt>=1.

3 - Class 3 SMS-DELIVERs are routed directly to **TE** using unsolicited result codes defined in <mt>=2. Messages of other data coding schemes result in indication as defined in <mt>=1.

<bm> - broadcast reporting option

0 - Cell Broadcast Messages are not sent to the **DTE**

2 - New Cell Broadcast Messages are sent to the **DTE** with the unsolicited result code:

**(PDU Mode)**

+CBM: <length><CR><LF><PDU>

where:

<length> - PDU length

<PDU> - message PDU

**(TEXT Mode)**

+CBM:<sn>,<mid>,<dcs>,<pag>,<pags><CR><LF><data>

where:

<sn> - message serial number

<mid> - message ID

<dcs> - Data Coding Scheme

<pag> - page number

<pags> - total number of pages of the message

<data> - CBM Content of Message

<ds> - SMS-STATUS-REPORTs reporting option

0 - status report receiving is not reported to the **DTE**

1 - the status report is sent to the **DTE** with the following unsolicited result code:



**(PDU Mode)**

**+CDS: <length><CR><LF><PDU>**

where:

**<length>** - PDU length

**<PDU>** - message PDU

**(TEXT Mode)**

**+CDS: <fo>,<mr>,<ra>,<tora>,<scts>,<dt>,<st>**

where:

**<fo>** - first octet of the message PDU

**<mr>** - message reference number

**<ra>** - recipient address, string type, represented in the currently selected character set (see +CSCS)

**<tora>** - type of number **<ra>**

**<scts>** - arrival time of the message to the SC

**<dt>** - sending time of the message

**<st>** - message status as coded in the PDU

2 - if a status report is stored, then the following unsolicited result code is sent:

**+CDSI: <memr>,<index>**

where:

**<memr>** - memory storage where the new message is stored

"SR"

**<index>** - location on the memory where SM is stored

**<bfr>** - buffered result codes handling method:

0 - **TA** buffer of unsolicited result codes defined within this command is flushed to the **TE** when **<mode>=1..3** is entered (**OK** response must be given before flushing the codes)

1 - **TA** buffer of unsolicited result codes defined within this command is cleared when **<mode>=1..3** is entered.

NOTE: Issuing **AT+CNMI<CR>** is the same as issuing the Read command.

NOTE: Issuing **AT+CNMI=<CR>** is the same as issuing the command **AT+CNMI=0<CR>**.

- wait for **OK**



**TIP:**

In this command description the values that are always 0 are parameter reserved for future use, in the current software revision the only value supported is 0.

For example:

1- Let us assume you want to eliminate all the unsolicited codes that may be sent when receiving SMS & Status Report:

command

**AT+CNMI= 0,0,0,0,0<cr>**

response:

**OK**

For example about a new message indication:

1- Let us assume you receive a new SMS delivery (AT+CNMI=1,1,0,0,0) and this new message is stored on the SIM "SM" storage at the location number 7; the unsolicited code you will receive (if code is enabled) is:

unsolicited code:

**+CMTI: "SM",7**

2- Let us assume you receive a new SMS Status Report delivery (AT+CNMI=1,0,0,2,0) and this new message is stored on the SIM "SR" storage at the location number 8; the unsolicited code you will receive is:

unsolicited code:

**+CDSI: "SR",8**

**3.6.1.5. Set Text Mode Parameters (only in TEXT mode)**

When the device is set to operate with Text SMS not with PDU, the SMS parameters that usually reside on the header of the PDU must be set apart with the command +CSMP.

- The parameters to be set are:
- Message Format
- Validity Period
- Protocol Identifier
- Data Coding Scheme

The meaning and format of the parameters is:

**Message format**, like defined for the first octet of message according to GSM 3.40/23.040:



The format is an 8-bit parameter divided into 6 fields and then reported as an integer:

<b>b7</b>	<b>b6</b>	<b>b5</b>	<b>b4</b>	<b>b3</b>	<b>b2</b>	<b>b1</b>	<b>b0</b>
<b>RP</b>	<b>UDHI</b>	<b>SRR</b>	<b>VPF</b>		<b>RD</b>	<b>MTI</b>	

where

**MTI message type parameter:**

0 1 - SMS Submit

0 1 - SMS DELIVER

**RD reject duplicates parameter**

0 – do not reject duplicates SMS in SC

1 - reject duplicates on SC

**VPF validity period format**

0 0 - Validity period NOT present

1 0 - VP integer represented (relative)

1 1 - VP semi octet represented (absolute)

0 1 - reserved

**SRR status report request**

0 - status report not requested

1 - status report requested

**UDHI user data Header Information**

0 - No Header on PDU

1 - Header present on PDU

**RP reply path**

0 - RP not set

1 - RP set

**Validity Period** numerical if in relative format or string if in absolute format

This parameter represents the validity period for the SMS after which the message must be disregarded instead of being delivered.

If in relative format (see VPF parameter) it is an integer:

0 to 143 - corresponding to  $(VP + 1) \times 5$  minutes

144 to 167 - corresponding to 12 hours +  $((VP - 143) \times 30)$  minutes

168 to 196 - corresponding to  $(VP - 166) \times 1$  day

197 to 255 - corresponding to  $(VP - 192) \times 1$  week

If in absolute format it is a string in the format:

**"gg/MM/YY,hh:mm:ss±tz"**



where

**gg** day of expiration (2 characters)

**MM** month of expiration (2 characters)

**YY** year of expiration (2 characters)

**hh** hour of expiration (2 characters)

**mm** minute of expiration (2 characters)

**ss** second of expiration (2 characters)

**±** sign of the time zone (+ or -)

**tz** time zone (2 characters)

**Protocol Identifier** in numerical format: This parameter identifies the protocol used by the receiver entity and informs the SC that the conversion from SMS to that protocol must be done while delivering the message.

Protocol ID	Conversion towards
0	Implicit (default)
33	telex (or teletex reduced to telex format)
34	group 3 telefax
35	group 4 telefax
36	voice telephone (i.e. conversion to speech)
37	ERMES (European Radio Messaging System)
38	National Paging system (known to the SC)
39	Videotex (T.100/T.101)
40	teletex, carrier unspecified
41	teletex, in PSPDN
42	teletex, in CSPDN
43	teletex, in analog PSTN
44	teletex, in digital ISDN
45	UCI (Universal Computer Interface, ETSI DE/PS 3 01-3)
46-47	(reserved, 2 combinations)
48	a message handling facility (known to the SC)
49	any public X.400-based message handling system
50	Internet Electronic Mail
51-55	(reserved, 5 combinations)
56-62	values specific to each SC, usage based on mutual agreement between



	the SME and the SC (7 combinations available for each SC)
63	A GSM mobile station. The SC converts the SM from the received TP-Data-Coding-Scheme to any data coding scheme supported by that MS (e.g. the default).
64	Short Message Type 0
65	Replace Short Message Type 1
66	Replace Short Message Type 2
67	Replace Short Message Type 3
68	Replace Short Message Type 4
69	Replace Short Message Type 5
70	Replace Short Message Type 6
71	Replace Short Message Type 7
72..94	Reserved
95	Return Call Message
96..126	Reserved
127	SIM Data download

**Data coding Scheme** as defined by GSM 3.38 - in numerical format The DCS is an 8-bit parameter reported as an integer, the default value is 0, otherwise for simplicity, we report only the most useful DCS, for further Schemes refer to GSM 3.38

B7	B6	b5	b4	b3	b2	b1	b0
1	1	1	1	0	Alphabet	Class	

where

**Alphabet**

0 - default Alphabet

1 - 8 bit

**Class**

0 0 - Class 0

0 1 - Class 1

1 0 - Class 2

1 1 - Class 3



**TIP:**

The default value for DCS = 0 represents the default SMS sent by a mobile. If you do not need any particular data coding scheme use DCS=0.



**NOTE:**

Not all the DCS combinations described in the 3gpp 3.38/23.038 are supported, both by the network and by the Telit UC864. Some features may be not implemented at network level or at device level, resulting in a +CMS ERROR: 303 (operation not supported) result code. If this happens then use a different DCS.



- send command **AT+CSMP=<fo>,<vp>,<pid>,<dc><cr>**

where:

**<fo>**: Message format

**<vp>**: Validity Period

**<pid>**: Protocol Identifier

**<dc>**: Data coding Scheme

- wait for OK

For example:

1- Let us assume you want to set the SMS parameters to the values:

**Message Format:**

- SMS submit
- do not reject duplicates
- VP Format integer (relative)
- status report not requested
- No Header on PDU
- Reply path not set

Hence, the message format is the binary number 00010001 corresponding to the integer 17.

- Validity period 24 hours corresponding to an integer value 167. 12 hours + ((167 -143) x 30 min) = 24 hours
- Protocol ID implicit (SMS sent to a mobile terminal) corresponding to a value 0.
- DCS default value 0.

command

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

response:

**OK**

2- Let us assume you want to set the SMS parameters to the values:

**Message Format:**

- SMS submit
- do not reject duplicates
- VP Format semi octet (absolute)





<memw>: memory storage for Write and Send commands

<mems>: memory storage for new incoming message saving

- wait for response in the format:

+CPMS:<usedr>,<totalr>,<usedw>,<totalw>,<useds>,<totals>

OK

where

<usedr> - number of SMS stored into <memr>

<totalr> - max number of SMS that <memr> can contain

<usedw> - number of SMS stored into <memw>

<totalw> - max number of SMS that <memw> can contain

<useds> - number of SMS stored into <mems>

<totals> - max number of SMS that <mems> can contain

From this response you can check if the selected storage has room for new SMSs, the free positions in the storage X (where X can be r,w,s) are <totalX> -<usedX>.

### 3.6.2. IRA Character Set

The character set used in SMS text mode is the IRA. This set defines each char as a 7-bit value, hence from 0x00 to 0x7F. The table below reports all the chars supported and their hexadecimal code. To obtain the code for a char in the table remember that in the row it is reported the least significant nibble (4 bits) and in the column the most significant nibble. The empty cells correspond to reserved combinations.

		Most Significant Nibble							
		0x	1x	2x	3x	4x	5x	6x	7x
Least Significant Nibble	x0			SP <sup>1</sup>	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 <sup>2</sup>		*	:	J	Z	j	z
	xB			+	;	K		k	
	xC			,	<	L		l	
	xD	CR <sup>3</sup>		-	=	M		m	
	xE			.	>	N		n	
	xF			/	?	O	£	o	



- <sup>1</sup> - SP stands for space character
- <sup>2</sup> - LF stands for Line Feed character
- <sup>3</sup> - CR stands for Carriage Return character

For example:

1- Let us assume you want to find the IRA code for the character '&':

From the table you find:

- most significant Nibble: 2
- least significant Nibble: 6

Hence the IRA code for the '&' character is the hexadecimal 0x26.

2- Let us assume you have the IRA code 0x6B and you want to find the corresponding character:

From the table you find at the position

- most significant Nibble: 6
- least significant Nibble: B

Hence, the character corresponding to the 0x6B IRA code is 'k'.



**TIP:**

With the command AT+CSCS is possible to select the character set; the available types are:

“IRA” - ITU-T.50

”8859-1” - ISO 8859 Latin 1

”PCCP437” - PC character set Code Page 437.

”UCS2” - 16-bit universal multiple-octet coded character set (ISO/IEC10646)

Please refer to the AT command specification for the full command description.

### 3.6.3. Writing a New SMS to Storage

A new SMS can be written in the selected storage <memw> (in the current SW version only "SM" is supported) and then can be sent to the desired destination.

To write the new SMS:

- send command **AT+CMGW="<da>"<cr>**

where:

<da>: destination address

- wait for prompt ">"
- send SMS text (MAX 160 characters)



- end command with CTRL-Z character (0x1A hexadecimal) or abort command with ESC character (0x1B hexadecimal)
- wait for response:

Response	Reason	Action
+CMGW: <index>  OK	Message has been successfully written in position number <index>	proceed ahead
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CMS ERROR: 330	SMSC address unknown	Insert SMSC address (see par. 3.6.1.3)
+CMS ERROR: 322	Memory Full	memory is full, hence delete some records and retry.

Note: if command is aborted with ESC character, then only the OK result code is returned.

For example:

1- Let us assume you want to write a new SMS to the storage and the destination address is the number +39338123456789. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:

command

**AT+CMGW="+39338123456789"**

response:

>

now you can insert the message text in IRA format (note that the IRA format and ASCII format coincide for the alphabet characters but not for the other).

...here will be inserted the SMS message text...

conclude text with the character CTRL-Z

response:

**+CMGW: 3**

**OK**

In this case, the new SMS was successfully written to the location index 3 of the selected write memory.

### 3.6.4. Sending an SMS Previously Stored

An already written SMS can be sent from the selected storage <memw>.

To send the written SMS its location index is needed:



- send command **AT+CMSS=<index><cr>**

where:

**<index>**: SMS location index

- wait for response:

Response	Reason	Action
+CMSS: <mr>	Message has been successfully sent. <mr> represents the message reference number.	proceed ahead
OK		
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CMS ERROR: 330	SMSC address unknown	Insert SMSC address (see par. 3.6.1.3)
+CMS ERROR: 41	"Temporary Failure", may be that the device is not registered on any network	Check for signal strength and network registration
+CMS ERROR: 331	No network service	Check for signal strength and network registration
+CMS ERROR: 1	Unassigned number	The destination address number does not exist. Check it and repeat command.
+CMS ERROR: 42	network congestion	Retry later
+CMS ERROR: 96	Mandatory information missing	Check for destination address in the SMS, overwrite it and retry.

For example:

1- Let us assume you want to send a SMS that was written to the storage index position number 3. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:

command

**AT+CMSS=3**

response:

**+CMSS: 1**

**OK**

In this case, the SMS was successfully sent to the destination and its network message reference number is 1.

### 3.6.5. Sending a New SMS Without Storing It

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

- send command **AT+CMGS="<da>"<cr>**



where:

**<da>**: destination address

- wait for prompt ">"
- send SMS text (MAX 160 characters)
- end command with CTRL-Z character (0x1A hexadecimal) or abort command with ESC character (0x1B hexadecimal)
- wait for response:

Response	Reason	Action
+CMGS: <mr> OK	Message has been successfully sent. <mr> represents the message reference number.	proceed ahead
ERROR	some error occurred	Enable the extended error codes report (see par.2.7.2.1) and retry.
+CMS ERROR: 330	SMSC address unknown	Insert SMSC address (see par. 3.6.1.3)
+CMS ERROR: 41	"Temporary Failure", may be that the device is not registered on any network	Check for signal strength and network registration
+CMS ERROR: 331	No network service	Check for signal strength and network registration
+CMS ERROR: 1	Unassigned number	The destination address number does not exist. Check it and repeat command.
+CMS ERROR: 42	network congestion	Retry later
+CMS ERROR: 96	Mandatory information missing	Check for destination address in the SMS, overwrite it and retry.
OK	command aborted by user	you issued a ESC char

For example:

1- Let us assume you want to directly send a new SMS to the destination address number +39338123456789. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:

command

**AT+CMGS="+39338123456789"**

response:

>

now you can insert the message text in IRA format (note that the IRA format and ASCII format coincide for the alphabet characters but not for the other).



...here will be inserted the SMS message text to be sent...

conclude text with the character CTRL-Z

response:

**+CMGS: 4**

**OK**

In this case, the new SMS was successfully sent to the SC and its network reference number is 4.

Do not confuse message reference with message index position, the first indicates the network reference for identifying the sent message (the eventually requested status report will have the same reference) while the second indicates the position where the message has eventually been stored in the memory.

### 3.6.6. Deleting an SMS

An already written/received SMS can be deleted from the selected storage.

To delete the SMS its location index is needed:

- send command **AT+CMGD=<index>[,<delflag>]<cr>**

where:

**<index>**: SMS location index, if **<delflag>** = 0

Test command shows the valid memory locations and optionally the supported values of **<delflag>**.

**<delflag>**: an integer indicating multiple message deletion request as follows:

0 (or omitted) Delete the message specified in **<index>**

1 Delete all read messages from preferred message storage, leaving unread messages and stored mobile originated messages (whether sent or not) untouched

2 Delete all read messages from preferred message storage and sent mobile originated messages, leaving unread messages and unsent mobile originated messages untouched

3 Delete all read messages from preferred message storage, sent and unsent mobile originated messages leaving unread messages untouched.

4 Delete all messages from preferred message storage including unread messages.

- wait for response:

Response	Reason	Action
OK	Message has been successfully deleted.	proceed ahead
ERROR	some error occurred	Enable the extended error



		codes report (see par.2.7.2.1) and retry.
+CMS ERROR: 321	Invalid memory index e.g. the given record was already empty	Check the <index> number and retry.

For example:

1- Let us assume you want to delete a previously written SMS that was written to the storage index position number 3. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:

command

**AT+CMGD=3**

response:

**OK**

In this case, the SMS was successfully deleted.

2- Let us assume you want to delete a received SMS that was stored to the index position number 7:

command

**AT+CMGD=7**

response:

**OK**

### 3.6.7. Reading an SMS

A new SMS can be read with the command

- send command **AT+CMGR=<index><cr>**

where:

**<index>**: SMS location index

- wait for response in the format:

Output format for received messages (the information written in italics will be present depending on **+CSDH** last setting):

**+CMGR: <stat>,<oa>,<alpha>,<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>**

Output format for sent messages:

**+CMGR: <stat>,<da>,<alpha>[,<toda>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>**



Output format for message delivery confirm:

**+CMGR: <stat>,<fo>,<mr>,,,<scts>,<dt>,<st>**

where:

**<stat>** - status of the message

**"REC UNREAD"** - new received message unread

**"REC READ"** - received message read

**"STO UNSENT"** - message stored not yet sent

**"STO SENT"** - message stored already sent

**<fo>** - first octet of the message PDU

**<mr>** - message reference number

**<scts>** - arrival time of the message to the SC

**<dt>** - sending time of the message

**<st>** - message status as coded in the PDU

**<pid>** - Protocol Identifier

**<dcS>** - Data Coding Scheme

**<oa>** - Originator address, string type represented in the currently selected character set (see **+CSCS**)

**<da>** - Destination address, string type represented in the currently selected character set (see **+CSCS**)

**<alpha>** - string type alphanumeric representation of **<da>** or **<oa>**, corresponding to an entry found in the phonebook; used character set is the one selected with command **+CSCS**. *NB: this optional field is currently not supported.*

**<sca>** - Service Centre number

**<toa>,<tda>,<tosca>** - type of number **<oa>,<da>,<sca>**

129 - number in national format

145 - number in international format (contains the "+")

**<length>** - text length

**<data>** - TP-User\_data

If **<dcS>** indicates that GSM03.38 default alphabet is used , each character of GSM alphabet will be converted into current TE character set (see **+CSCS**)

If **<dcS>** indicates that 8-bit or UCS2 data coding scheme is used, each 8-bit octet will be converted into two IRA character long hexadecimal number (e.g. octet 0x2A will be converted as two characters 0x32 0x41)

Note: in both cases if status of the message is 'received unread', status in the storage changes to 'received read'. An error result code is sent on empty record **<index>**.



For example:

1- Let us assume you want to read the SMS that is stored at the position index 4. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:

command

**AT+CMGR=4**

response:

**+CMGR: "STO UNSENT", "+393351234565"**

Telit Test Message for Text Mode SMS.

**OK**

In this case the SMS was successfully read, the text contained was:

"Telit Test Message for Text Mode SMS."

The message was written to the storage by user (STO) but still not sent (UNSENT) to the destination address with the number +393351234565

2- Let us assume you want now to read the SMS that is stored at the position index 5:

command

**AT+CMGR=5**

response:

**+CMGR: "REC UNREAD", "+393381234567890", "29/06/01,12:30:04+01"**

Telit Test Message for Text Mode SMS RECEIVING.

**OK**

In this case the SMS was successfully read, the text contained was:

"Telit Test Message for Text Mode SMS RECEIVING."

The message was received (REC) from the number +393381234567890 at 12:30:04 the day 29/06/01 in the European time zone +1. After this read command the message at index 5 becomes REC READ.

### 3.6.8. Listing a Group of SMSs

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

- REC UNREAD                      received messages still not read
- REC READ                        received messages already read
- STO UNSENT                    written messages not yet sent
- STO SENT                        written messages already sent



- ALL all types of messages

It is possible to have the list of all the messages in one group:

- send command **AT+CMGL=<stat><cr>**

where:

<stat> - status group of the message

"REC UNREAD" - new message

"REC READ" - read message

"STO UNSENT" - stored message not yet sent

"STO SENT" - stored message already sent

"ALL" - all messages

- wait for response in the format:

For every message in the group:

**+CMGL: <index>,<stat>,<oa/da> [,,<toa/toda>,<length>]**

**<CR><LF><text>**

where:

<index> - message index position on the storage

<stat> - status of the message

"REC UNREAD" - new message

"REC READ" - read message

"STO UNSENT" - stored message not yet sent

"STO SENT" - stored message already sent

<oa/da> - sender number/destination number

<toa/toda> - type of number <oa/da>

145 - international number (contains "+" character)

129 - national number

<length> - length of the message text in characters

<text> - message text

Note: If status of the message is 'received unread', status in the storage changes to 'received read'.

For example:

1- Let us assume you want to list all the SMS received read that are stored. We suppose you already have set up the device for text SMS mode as described on the previous paragraphs:



command

**AT+CMGL="REC READ"**

response:

**+CMGL: 5, "REC READ", "+393381234567890"**

Telit Test Message for Text Mode SMS RECEIVING.

**+CMGL: 8, "REC READ", "+393381234567890"**

Telit Second Test Message for Text Mode SMS RECEIVING.

**OK**

In this case the SMS group was successfully read, the messages Received UNREAD were two in the position indexes 5 & 8. The optional parameters **<toa/toda>** and **<length>** were not shown.

### 3.7. Using General Purpose Input/Output pins

The Telit UC864-K provides various General Purpose Input/Output pins, these pins can be configured via AT commands as Inputs, Outputs and two of them as "alternate function".

The "alternate function" are supported by pins GPIO5, which can be configured to become a RF Transmission monitor output pin that reflects the RF transmission activation, GPIO6, which can be configured to become an alarm output pin that reflects the alarm status, and GPIO7 which can be configured to become a buzzer output pin.

With these pins your application can control external hardware directly using the Telit UC864-K pins, with little or even no hardware added.

#### 3.7.1. GPIO pin setup

Before using the GPIO pin, you must configure them to select their direction or alternate function

##### 3.7.1.1. Setting GPIO pin as OUTPUT

When you set a GPIO as output, you must specify also the value that the pin output must take:

- send command **AT#GPIO=<pin>,<value>,1<cr>**

where:

**<pin>** is the GPIO pin number at which the command applies:

- |           |             |
|-----------|-------------|
| 1 - GPIO1 | 12 - GPIO12 |
| 2 - GPIO2 | 13 - GPIO13 |
| 3 - GPIO3 | 14 - GPIO14 |



4 - GPIO4	15 - GPIO15
5 - GPIO5	16 - GPIO16
6 - GPIO6	17 - GPIO17
7 - GPIO7	18 - GPIO18
8 - GPIO8	19 - GPIO19
9 - GPIO9	20 - GPIO20
10 - GPIO10	21 - GPIO21
11 - GPIO11	22 - GPIO22

<value> is the GPIO pin value that the pin will assume:

- 0 - LOW
- 1 - HIGH

- wait for response **OK**




---

**NOTE:**

The **#GPIO** setting is not saved and will be lost on power off, so at start-up repeat pin initialization commands. At start-up the setting for GPIO6 and GPIO7 instead is maintained even after a shutdown to permit alarm & buzzer feature to work always.

---

For example:

1- Let us assume you want to set GPIO3 pin as Output and you want it to be in LOW status:

command

**AT#GPIO=3,0,1<cr>**

response:

**OK**

In this case, the GPIO3 pin was successfully put in output direction and its status has been set to LOW.

**3.7.1.2. Setting GPIO pin as INPUT**

When you set a GPIO as input, you must specify also a dummy value for the pin state:

- send command **AT#GPIO=<pin>,<dummy\_value>,0<cr>**

where:

**<pin>** is the GPIO pin number at which the command applies:

- 1 - GPIO1
- 12 - GPIO12



2 - GPIO2	13 - GPIO13
3 - GPIO3	14 - GPIO14
4 - GPIO4	15 - GPIO15
5 - GPIO5	16 - GPIO16
6 - GPIO6	17 - GPIO17
7 - GPIO7	18 - GPIO18
8 - GPIO8	19 - GPIO19
9 - GPIO9	20 - GPIO20
10 - GPIO10	21 - GPIO21
11 - GPIO11	22 - GPIO22

<value> is a dummy value can be either:

0 - dummy value

1 - dummy value

- wait for response **OK**



---

**NOTE:**

The **#GPIO** setting for all GPIO except from GPIO6, GPIO7, is not saved and will be lost on power off, so at start-up repeat pin initialization commands.

At start-up all the GPIOs except from GPIO6 & GPIO7 are configured by default as INPUT, but the setting for GPIO6 and GPIO7 instead is maintained even after a shutdown to permit alarm & buzzer feature to work always.

---

For example:

1- Let us assume you want to set GPIO4 pin as Input:

command

**AT#GPIO=4,0,0<cr>**

response:

**OK**

In this case, the GPIO4 pin was successfully put in input direction.

### 3.7.2. GPIO pin use

After having set-up the GPIO pin direction you can query the input status of an INPUT pin or set the output status of an OUTPUT pin.



### 3.7.2.1. Querying GPIO pin status

To query for the pin status:

- send command **AT#GPIO=<pin>,2<cr>**

where:

**<pin>** is the GPIO pin number at which the command applies:

1 - GPIO1	12 - GPIO12
2 - GPIO2	13 - GPIO13
3 - GPIO3	14 - GPIO14
4 - GPIO4	15 - GPIO15
5 - GPIO5	16 - GPIO16
6 - GPIO6	17 - GPIO17
7 - GPIO7	18 - GPIO18
8 - GPIO8	19 - GPIO19
9 - GPIO9	20 - GPIO20
10 - GPIO10	21 - GPIO21
11 - GPIO11	22 - GPIO22

- wait for response in the format:

**#GPIO: <dir>,<stat>**

**OK**

where:

**<dir>** - GPIO<pin> direction setting

**<stat>** - status of the pin

0 - LOW

1 - HIGH



#### NOTE:

In case the GPIO pin direction is set to ALTERNATE FUNCTION (2), then the reported <stat> has no meaning and must not be kept as valid, but must be treated as a dummy value.



---

**TIP:**

The query reports depending on the pin direction:

- the read pin status in case the direction is input;
- the previously set pin status in case the direction is output.

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

---

For example:

1- Let us assume you want to query the GPIO3 pin for its status:

command

**AT#GPIO=3,2<cr>**

response:

**#GPIO: 0,1**

**OK**

In this case, the GPIO3 pin was set in input direction and its status has been measured to be HIGH.

2- Let us assume you want to query the GPIO4 pin for its status:

command

**AT#GPIO=4,2<cr>**

response:

**#GPIO: 1,0**

**OK**

In this case, the GPIO4 pin was set in output direction and its status is LOW.

3- Let us assume you want to query the GPIO6 pin for its status:

command

**AT#GPIO=6,2<cr>**

response:

**#GPIO: 2,0**

**OK**

In this case, the GPIO pin was set in "alternate function" direction and therefore works as alarm output. The reported status = LOW has no meaning.

### 3.7.2.2. Setting GPIO Pin Output Status

To set the pin status (when pin is set as OUTPUT):



- send command **AT#GPIO=<pin>,<value>,1<cr>**

where:

**<pin>** is the GPIO pin number at which the command applies:

1 - GPIO1	12 - GPIO12
2 - GPIO2	13 - GPIO13
3 - GPIO3	14 - GPIO14
4 - GPIO4	15 - GPIO15
5 - GPIO5	16 - GPIO16
6 - GPIO6	17 - GPIO17
7 - GPIO7	18 - GPIO18
8 - GPIO8	19 - GPIO19
9 - GPIO9	20 - GPIO20
10 - GPIO10	21 - GPIO21
11 - GPIO11	22 - GPIO22

**<value>** is the pin value to be set and can be:

- 0 - LOW
- 1 - HIGH

- wait for response **OK**

For example:

1- Let us assume you want to set the GPIO3 pin HIGH:

command

**AT#GPIO=3,1,1<cr>**

response:

**OK**

In this case, the GPIO3 pin was set in output direction and its status has been set to HIGH.

### 3.7.2.3. Using GPIO5 Pin as RFTXMON OUTPUT (alternate function)

When you set the GPIO5 pin as RFTXMON output function, the pin reports the Transmitter active status. To set the pin in alternate function you must specify also a dummy value for the pin state:

- Send command **AT#GPIO=5,<dummy\_value>,2<cr>**

where:





**TIP:**

Remember that the alternate function places the GPIO6 pin always in OUTPUT direction and since the GPIO6 pin value is controlled by the internal software, the corresponding function (+CALA) must be setup properly.

**NOTE:**

The #GPIO6 direction setting is saved and will be kept after a power off.

For example:

1- Let us assume you want to set GPIO6 pin as ALARM OUTPUT:

command

**AT#GPIO=6,0,2<cr>**

response:

**OK**

In this case, the GPIO6 pin was successfully put in alarm output direction.

**3.7.2.5. Using GPIO7 pin as BUZZER OUTPUT (alternate function)**

When you set the GPIO7 pin as buzzer output function, the pin will output a waveform suitable to drive a Buzzer, provided a simple external mosfet driver is developed and that the #SRP settings are adequate. To set the pin in alternate function you must specify also a dummy value for the pin state:

- send command **AT#GPIO=7,<dummy\_value>,2<cr>**

where:

**<value>** is a dummy value can be either:

0 - dummy value

1 - dummy value

- wait for response **OK**



**TIP:**

Remember that the alternate function places the GPIO7 pin always in OUTPUT direction and since the GPIO7 pin value is controlled by the internal software, the corresponding function (#SRP) must be setup properly.

**NOTE:**

The #GPIO7 direction setting is saved and will be kept after a power off.

For example:



1- Let us assume you want to set GPIO7 pin as BUZZER OUTPUT:

command

**AT#GPIO=7,0,2<cr>**

response:

**OK**

In this case, the GPIO7 pin was successfully put in buzzer output direction.

### 3.8. Clock/Alarm Function

The Telit UC864-K provides a Real Time Clock and Alarm embedded in the product; it is therefore possible to set-up the proper time, check the actual time, set-up an alarm time at which the alarm will be triggered with various behavior depending on the +CALA setting.

The only requirement is that the power input to the Telit UC864-K has to be guaranteed without interruptions, the Telit UC864-K has no backup battery; therefore it will lose the time setting if its power supply is interrupted.

On Alarm trigger the Telit UC864-K can:

- automatically Wake-up fully operative from shutdown as if the ON/OFF
- automatically Wake-up from shutdown in a special status namely "alarm status" where it will not look for or try to register into any network, as if it would be off, except from the fact that it proceeds with the alarm action and it can receive commands to return completely operative or shutdown immediately.
- If already ON at alarm trigger time, simply proceed with the Alarm action

Once Woken-up the Telit UC864-K proceeds with the chosen action that can be

- issue an unsolicited code "+ALARM: <user\_text>" on the serial port until a 90s timeout expires or a special Wake-up command is received
- play an Alarm tone until a 90s timeout expires or a special Wake-up command is received
- rise the pin GPIO6 until a 90s timeout expires or a special Wake-up command is received
- any combination of these actions

With these features, the Telit UC864-K for example can:

- Wake-up itself and its controlling hardware by using the GPIO6 pin at the desired time, so timely surveys can be programmed without the need to keep the any hardware on and therefore reducing power consumption to a minimum.
- Activate some special hardware on time trigger event with the GPIO6 pin.
- Alert the controlling application that the alarm time has come with the unsolicited code "+ALARM:<user\_text>".



- Alert the user with the alarm tone played.

### 3.8.1. Clock Date/Time

Before using the Alarm feature, you must regulate the internal clock.

#### 3.8.1.1. Regulate the Clock

- send command **AT+CCLK="<time>"<cr>**

where:

**<time>** - current time as quoted string in the format : "yy/MM/dd,hh:mm:ss±zz"

**yy** - year (two last digits are mandatory), range is 00..99

**MM** - month (two last digits are mandatory), range is 01..12

**dd** - day (two last digits are mandatory), range is 01..31 (if the month MM has less than 31 days, the clock will be set for the next month)

**hh** - hour (two last digits are mandatory), range is 00..23

**mm** - minute (two last digits are mandatory), range is 00..59

**ss** - seconds (two last digits are mandatory), range is 00..59

**±zz** - time zone (indicates the difference, expressed in quarter of an hour, between the local time and GMT; two last digits are mandatory), range is -47..+48

Note: If the parameter is omitted the behaviour of Set command is the same as Read command.

- wait for response **OK**




---

#### TIP:

Remember that the string time has to be encapsulated in double brackets.

---




---

#### NOTE:

The time will start immediately after the time setting command.

---

For example:

1- Let us assume you want to regulate your clock to 7 November 2002 at 12h 24m 30s for the time zone +01h central Europe:

command

**AT+CCLK="02/11/07,12:24:30+04"<cr>**

response:



**OK**

In this case, the time was successfully set.

### 3.8.1.2. Read the Current Date/Time

- send command **AT+CCLK?<cr>**
- wait for response in the format:

**+CCLK: <time>**

**OK**

Note: the three last characters of <time> are not returned by **+CCLK?** because the **ME** doesn't support time zone information.

For example:

1- Let us assume you want now to read the current time:

command

**AT+CCLK?<cr>**

response:

**+CCLK="02/11/07,12:26:47"<cr>**

**OK**

In this case the current date/time is: 7 November 2002 12h 26m 47s

## 3.8.2. Alarm Function

Once the current time has been set, the alarm function can be setup.

### 3.8.2.1. Regulate the Alarm Time & Behavior

- send command **AT+CALA="<time>",0,<type>,"<text>"<cr>**

where:

**<time>** is the Alarm time string in the same format of the clock setting command **yy/MM/dd, hh:mm:ss±zz**

where:

**yy**: two digits year (00-99)

**MM**: two digits month (01-12)

**dd**: two digits day (01-31)

**hh**: two digits hour (00-24)

**mm**: two digits minute (00-60)

**ss**: two digits seconds (00-60)



**±zz:** signed two digits timezone (-11 - +11)

**<type>** is the Alarm behavior:

0 - reserved for other equipment use.

1 - the MODULE simply wakes up fully operative as if the ON/OFF button had been pressed. If the device is already ON at the alarm time, then it does nothing.

2 - the MODULE wakes up in "alarm mode" if at the alarm time it was off, otherwise it remains fully operative. In both cases the MODULE issues an unsolicited code every 3s:

**+ALARM: <text>**

where:

**<text>** is the **+CALA** optional parameter previously set.

The device keeps on sending the unsolicited code every 3s until a **#WAKE** or **#SHDN** command is received or a 90s timeout occurs. If the device is in "alarm mode" and it does not receive the **#WAKE** command within 90s then it shuts down. (default)

3 - the MODULE wakes up in "alarm mode" if at the alarm time it was off, otherwise it remains fully operative. In both cases the MODULE starts playing the alarm tone on the selected path for the ringer (see command **#SRP**)

The device keeps on playing the alarm tone until a **#WAKE** or **#SHDN** command is received or a 90s timeout occurs. If the device is in "alarm mode" and it does not receive the **#WAKE** command within 90s then it shuts down.

4 - the MODULE wakes up in "alarm mode" if at the alarm time it was off, otherwise it remains fully operative. In both cases the MODULE brings the pin **GPIO6** high, provided its **<direction>** has been set to alarm output, and keeps it in this state until a **#WAKE** or **#SHDN** command is received or a 90s timeout occurs. If the device is in "alarm mode" and it does not receive the **#WAKE** command within 90s then it shuts down.

5 - the MODULE will make both the actions as for **<type>=2** and **<type>=3**.

6 - the MODULE will make both the actions as for **<type>=2** and **<type>=4**.

7 - the MODULE will make both the actions as for **<type>=3** and **<type>=4**.

8 - the MODULE wakes up in "alarm mode" if at the alarm time it was off, otherwise it remains fully operative. In both cases the MODULE sets **High** the **RI** output pin. The **RI** output pin remains **High** until next **#WAKE** issue or until a 90s timer expires. If the device is in "alarm mode" and it does not receive the **#WAKE** command within 90s. After that it shuts down.

**<text>** - unsolicited alarm code text string. It has meaning only if **<type>** is equal to 2 or 5 or 6.

- Wait for response OK





**TIP:**

Remember that the string time has to be encapsulated in double brackets, furthermore the Alarm time is computed for different time zone, therefore the alarm time always refers to the same time zone as the clock setting regardless the time zone set in the +CALA command.



**NOTE:**

If you use the GPIO6 pin as ALARM OUTPUT, then you MUST set its direction to "alternate function" (see par. 3.7.2.4) otherwise the pin does not respond to the alarm settings.

In case the alarm mode is equal to 1,3,7 then a dummy empty text is inserted "".

**NOTE:**

If you use the unsolicited codes **+ALARM: <text>**, then you must fix the port speed rate (see par. 2.7.1) and store it in the active profile (see command &W), in order to make the Telit UC864-K boot with the desired port speed, otherwise at the alarm wakeup, the module starts with the default port speed that may differ from yours.

### 3.8.2.2. Stop the Alarm Activity

When the alarm time expires, the module starts the alarm activity according to the alarm behavior parameter **<type>** selected.

To stop the Alarm activity there are three ways, you can either decide to exit from alarm and shutdown the device or exit from alarm and entering the normal operational status; otherwise you can leave the alarm go on until the 90s timeout is reached.

#### 3.8.2.2.1. Exit from the alarm status and shutdown

- send command **AT#SHDN<cr>**
- wait for response **OK**

At the OK result code, the device will end alarm activity and shutdown.

#### 3.8.2.2.2. Exit from the alarm status and enter the normal operating mode

- send command **AT#WAKE=0<cr>**
- wait for response **OK**

At the OK result code, the device will end alarm activity and enter normal operating mode. If the device was already in normal operating mode (alarm has started when



the module was already ON), then with the command only the alarm activity is terminated.

### 3.8.2.3. Querying the Alarm Status

When the device awakes by means of an alarm time expire, the module starts the alarm activity but not the network activity, permitting some operations to be done by the controlling application without registering the mobile in the network.

To check if the mobile is in the "alarm status" and therefore no network activity is done or if the device is in normal operating status:

- send command **AT#WAKE?<cr>**
- wait for response in the format:

**+WAKE: <status>**

**OK**

where:

**<status>** is the operating mode:

0 - normal operating mode

1 - alarm mode




---

#### NOTE:

If the device is in the alarm mode no network activity is done, therefore the only commands that are accepted are the #WAKE and #SHDN ones.

When in the alarm mode, no operation is allowed towards the network, therefore it is not possible to receive or send calls, SMS and whatever WCDMA/GSM/GPRS services.

---

#### 3.8.2.3.1. Alarm operation example

For example:

1- Let us assume you have a battery powered device, a meteorological unit that measures every hour the conditions and therefore needs to send a new SMS every hour to the central server, for example indicating the whether status just measured. Let say your application must consume the absolute minimum power to achieve the job, since it will be placed in a remote position where its battery must last as long as possible and therefore it must shutdown completely and wake up every hour for just the time needed to measure & send the whether, successively shutdown.

set up the time in the internal clock (only the first time)

command

**AT+CCLK="02/11/07,12:24:30+01"<cr>**

response

**OK**



set up the next alarm in order to raise the GPIO6 pin to power up the controlling application too.

command

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

response

**OK**

- shutdown the UC864-K and successively the controlling application.

command

**AT#SHDN<cr>**

response

**OK**

... after an hour..

The UC864-K will turn itself ON in "Alarm Mode" and contemporarily both rise the GPIO6 pin which turns on the power to the controlling application and issue every 3s an unsolicited code +ALARM: TIME TO MEASURE & SMS...!

turn on the keep alive line in the controlling application that keeps itself ON.

stop the alarm activity in the UC864-K (recognized by the +ALARM unsolicited code) and bring the UC864-K in operating mode

command

**AT#WAKE=0<cr>**

response

**OK**

take the whether measure

send the SMS with the whether data (see Sending a New SMS Without Storing It par. 3.6.5).

read the current time.

command

**AT+CCLK?<cr>**

response

**+CCLK="02/11/07,13:24:47" <cr>**

**OK**

calculate & set up the next alarm in order to raise the GPIO6 pin to power up the controlling application too.

command

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



response

**OK**

shutdown the UC864-K and successively the controlling application.

command

**AT#SHDN<cr>**

response

**OK**



## 4. Packet Switched Data operations

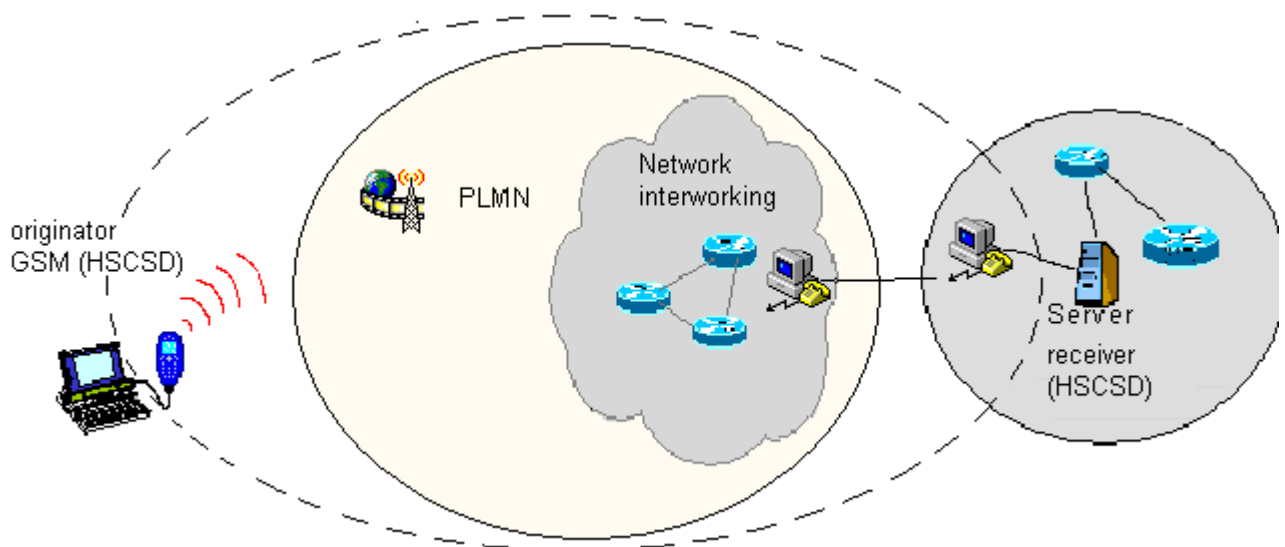
### 4.1. Introduction

The Packet Switched Data(PSD) connection on GPRS, EDGE, WCDMA and HSDPA network permits DATA transfers in a completely different way with respect to previous point to point communications made with Circuit Switch Data (CSD) connection on GSM and WCDMA network.

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

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

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

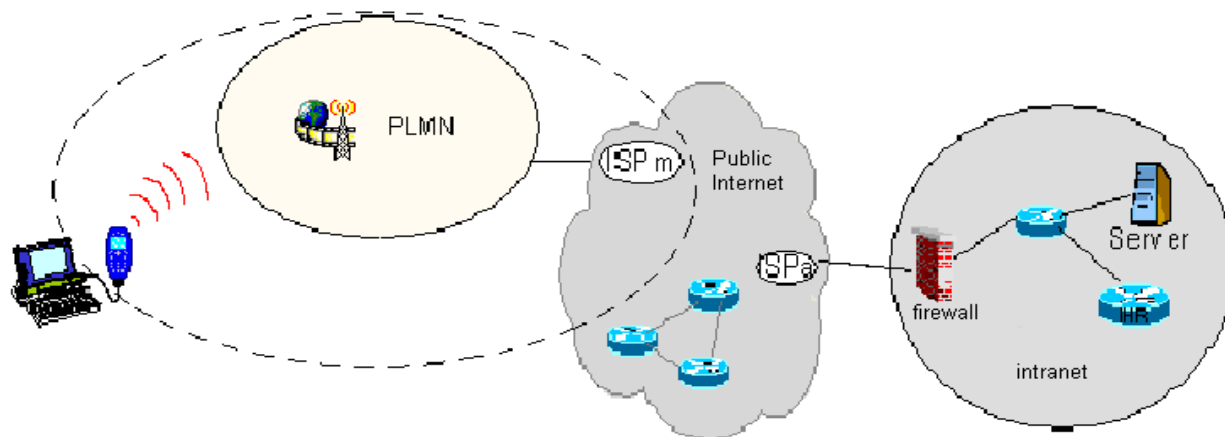


Wireless Cellular CSD interconnectivity



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

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



Wireless Cellular PSD *interconnectivity*

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

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

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

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

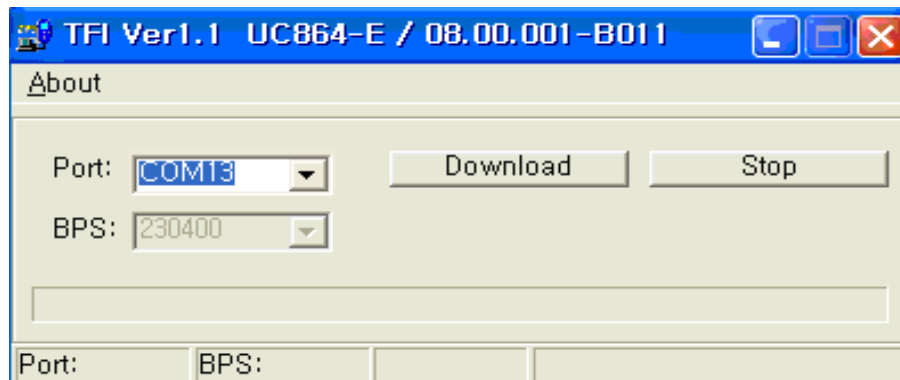


- the GPRS connection speed with a GPRS class 12 multislot device is asymmetrical, 4 time slots in reception (80000 bps max in CS4), 4 time slot in sending (80000 bps max in CS4) and 5 time slot in active(tx time slot + rx time slot).
- the EDGE connection speed with a EDGE class 12 multislot device is asymmetrical, 4 time slots in reception (236800 bps max in MCS9), 4 time slot in sending (236800 bps max in MCS9) and 5 time slot in active(tx time slot + rx time slot).
- the WCDMA connection speed is symmetrical, 384kbps in reception and sending.
- the HSDPA connection speed with a category 8 device is asymmetrical, 7.2Mbps in reception and 384kbps in sending.
- The controlling application of the module must have a TCP/IP - PPP software stack to interface with the PSD modems.
- The controlling application must relay on some ISP that may be the Network Operator of the SIM or USIM to gain access to the internet through the PSD connection.
- Because of the point before, the receiving application must have internet access either.
- Since the communication is based upon TCP/IP packets, then it is possible to talk contemporarily with more than one peer.
- When required, the data security in internet must be guaranteed by security protocols over the TCP/IP that must be managed by the controlling application.

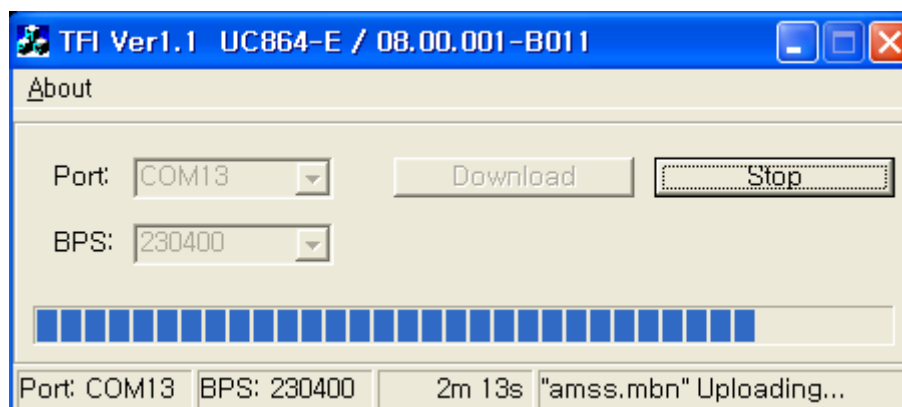




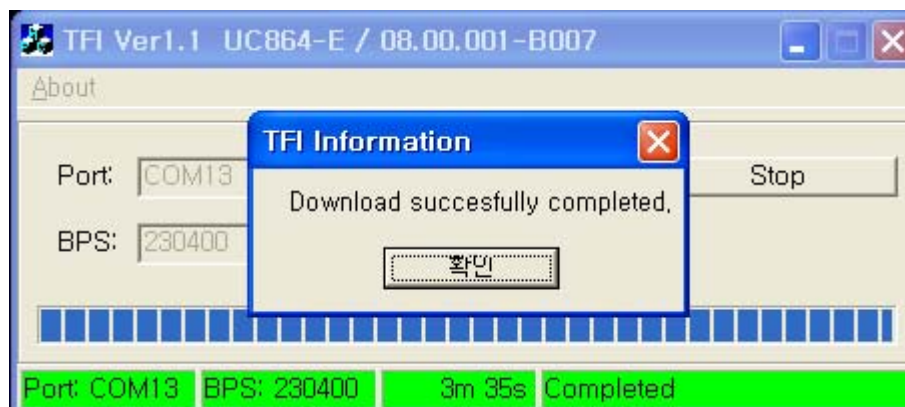




- Select the right COM port and speed. Note that to go faster than 115200 you need a special hardware on the PC. Then Press the Download button and within 5 seconds power-on the UC864.
- Firmware Version displayed on Title bar is current firmware version.



Wait for the end of programming green message OK.



The Telit UC864 module is now programmed with the new firmware.



## 6. SMS PDU Format Guide (Ver 1.0.0)

### 6.1. Introduction

UC864-K 는 3GPP 27.005 AT Command 기 SMS 동 니다.

3GPP 27.005 된 AT command 는 게 Text / PDU 2 가 드가 ,  
Text 드는 Text String 기 AT command ,  
PDU 드는 Raw Data 기 AT command 니다.

SMS TP-DU(User Data)는 Text String 기 되어 기능 가 User Data Header  
TP-DU 는 되었 니다. 국내 업 경 Reply Address Element, Call Back number,  
Special SMS Message Indication 등등 User Data Header TP-DU 되어  
됩니다. 따라 3GPP 27.005 된 AT command User Data Header 기  
는 PDU 드 SMS 동 야 니다.

아 는 PDU 드 기 SMS User Data Encoding / Decoding  
니다.

### 6.2. References

- ✓ 3GPP TS 23.038 : Alphabets and language-specific information
- ✓ 3GPP TS 23.040 : Technical realization of Short Message Service (SMS)
- ✓ 3GPP TS 24.011 : Point-to-Point (PP) Short Message Service (SMS) support on Mobile Radio Interface
- ✓ 3GPP TS 27.005 : Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)
- ✓ SKT WCDMA SBSM 단 SMS 구 (WS-SMS-1.4)
- ✓ KTF WCDMA SMS 단 기 규격 (KTF-MS-WS V2.6.0)



### 6.3. Network Operator Requirements

#### 6.3.1. UC864-K 가능 DCS

- ✓ GSM7
- ✓ ASCII7
- ✓ KSC-5601
- ✓ UCS2
- ✓ 8Bit Data

#### 6.3.2. SKT DCS 구

TP-DCS 되는 Data Coding 내 담긴 따라, KSC5601, GSM 7bit[1] 구 되어 야 다. 기 GSM 7bit , KSC5601 내 글 또는 2 가 된 경 KSC5601 단 다. 각 드 TP-DCS 값 다 과 값다.

TP-DCS 따라 TP-UD 내 담긴 데 다 값 야 다. SMS 단 기는 KSC-5601, ASCII7, GSM7, UCS2, 8bit Data 두 Decoding 가능 야 다.

구	KSC5601	UCS2	GSM7
TP-DCS	0x84	0x08	0x00

#### 6.3.3. KTF DCS 구

TP-DCS 되는 Data Coding KSC5601, GSM 7bit 야 다. 된 UCS2 대 는 드 그 는 European Alphabet(Basic Latin, Latin-1 Supplement, Latin Extended A), 글(Hangul Syllables, Hangul Compatibility Jamo) , 글 는 KSC5601 글 드 , KSC5601 없는 글 경 '□'또는 등 도 다. Combining 알아도 다.

구	KSC5601	UCS2	GSM7
TP-DCS	0x0C	0x08	0x00



## 6.4. SMS PDU Format

### 6.4.1. SMS-DELIVER type

Abbr.	Reference	P1)	R2)	Description
TP-MTI	TP-Message-Type-Indicator	M	2b	Parameter describing the message type.
TP-MMS	TP-More-Messages-to-Send	M	b	Parameter indicating whether or not there are more messages to send
TP-RP	TP-Reply-Path	M	b	Parameter indicating that Reply Path exists.
TP-UDHI	TP-User-Data-Header-Indicator	O	b	Parameter indicating that the TP-UD field contains a Header
TP-SRI	TP-Status-Report-Indication	O	b	Parameter indicating if the SME has requested a status report.
TP-OA	TP-Originating-Address	M	2-12o	Address of the originating SME.
TP-PID	TP-Protocol-Identifier	M	o	Parameter identifying the above layer protocol, if any.
TP-DCS	TP-Data-Coding-Scheme	M	o	Parameter identifying the coding scheme within the TP-User-Data.
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o	Parameter identifying time when the SC received the message.
TP-UDL	TP-User-Data-Length	M	l	Parameter indicating the length of the TP-User-Data field to follow.
TP-UD	TP-User-Data	O	3)	



## 6.4.2. SMS-SUBMIT type

Abbr.	Reference	p1)	p2)	Description
TP-MTI	TP-Message-Type-Indicator	M	2b	Parameter describing the message type.
TP-RD	TP-Reject-Duplicates	M	b	Parameter indicating whether or not the SC shall accept an SMS-SUBMIT for an SM still held in the SC which has the same TP-MR and the same TP-DA as a previously submitted SM from the same OA
TP-VPF	TP-Validity-Period-Format	M	2b	Parameter indicating whether or not the TP-VP field is present.
TP-RP	TP-Reply-Path	M	b	Parameter indicating the request for Reply Path.
TP-UDHI	TP-User-Data-Header-Indicator	O	b	Parameter indicating that the TP-UD field contains a Header.
TP-SRR	TP-Status-Report-Request	O	b	Parameter indicating if the MS is requesting a status report.
TP-MR	TP-Message-Reference	M	l	Parameter identifying the SMS-SUBMIT.
TP-DA	TP-Destination-Address	M	2-12o	Address of the destination SME.
TP-PID	TP-Protocol-Identifier	M	o	Parameter identifying the above layer protocol, if any.
TP-DCS	TP-Data-Coding-Scheme	M	o	Parameter identifying the coding scheme within the TP-User-Data.
TP-VP	TP-Validity-Period	O	o/7o	Parameter identifying the time from where the message is no longer valid.
TP-UDL	TP-User-Data-Length	M	l	Parameter indicating the length of the TP-User-Data field to follow.
TP-UD	TP-User-Data	O	3)	

**Note:**

아 나 PDU 대 3GPP TS 23.040 고 랍니다.

SMS-DELIVER-REPORT type  
SMS-SUBMIT-REPORT type  
SMS-STATSE-REPORT type  
SMS-COMMAND type

## 6.5. Definition of the TPDU parameters

아 PDU 내 드간 관관계가 는 드 니, 나 드 대 3GPP TS 23.040 고 기 랍니다.

### 6.5.1. TP Validity Period Format (TP VPF)

The TP Validity Period Format is a 2 bit field, located within bit no 3 and 4 of the first octet of SMS SUBMIT, and to be given the following values:



bit4	bit3	
0	0	TP VP field not present
0	1	TP VP field present - relative format
1	0	TP-VP field present - enhanced format
1	1	TP VP field present - absolute format

**Note:**

UC864-K 는 당 TP-VPF 두 , 권 는 TP-VP field present - relative format(0x10) or TP-VP field not present(0x00) 권 , 그 기 랍니다.

또 , TP VP field not present(0x00) 경 아 TP-VP 는 가되 아야 니다.

### 6.5.2. TP Validity Period (TP-VP)

The TP Validity Period comprises 1 octet in integer representation, giving the length of the validity period, counted from when the SMS SUBMIT is received by the SC.

The representation of time is as follows:

TP VP value	Validity period value
0 to 143	(TP VP + 1) x 5 minutes (i.e. 5 minutes intervals up to 12 hours)
144 to 167	12 hours + ((TP VP - 143) x 30 minutes)
168 to 196	(TP VP - 166) x 1 day
197 to 255	(TP VP - 192) x 1 week

**Note:**

TP VP field present - relative format(0x10) 경 TP-VP 는 1Day 값 167(0xA7) 기 라 , 그 3GPP 23.040 기 랍니다.

### 6.5.3. TP User Data Length (TP UDL)

If the TP User Data is coded using the GSM 7 bit default alphabet, the TP User Data Length field gives an integer representation of the number of septets within the TP User Data field to follow. If the 7bit default-alphabet extension mechanism is used within the TP User Data (see 3GPP TS 23.038 [9]), the actual number of characters in the message shall be less than the number of septets.

If a TP User Data Header field is present, then the TP User Data Length value is the sum of the number of septets in the TP User Data Header field (including any padding) and the number of septets in the TP User Data field which follows. See figure 6.5(a). If the TP User Data is coded using 8 bit data, the TP User Data Length field gives an integer representation of the number of octets within the TP User Data field to follow. If a TP User Data Header field is present, then the TP



User Data Length value is the sum of the number of octets in the TP User Data Header field and the number of octets in the TP User Data field which follows. See figure 6.5(b).

If the TP User Data is coded using UCS2 [24] data, the TP User Data Length field gives an integer representation of the number of octets within the TP User Data field to follow. If a TP User Data Header field is present, then the TP User Data Length value is the sum of the number of octets in the TP User Data Header field and the number of octets in the TP User Data field which follows. See figure 9.2.3.24 (b).

If the TP User Data is coded using compressed GSM 7 bit default alphabet or compressed 8 bit data or compressed UCS2 [24] data, the TP User Data Length field gives an integer representation of the number of octets after compression within the TP User Data field to follow. If a TP User Data Header field is present, then the TP User Data Length value is the sum of the number of uncompressed octets in the TP User Data Header field and the number of octets in the compressed TP User Data field which follows. See figure 9.2.3.24 (c).

For other Data Coding Schemes, see 3GPP TS 23.038 [9]. If this field is zero, the TP User Data field shall not be present.

**Note:**

User Data Length 는 것과 같 GSM 7bit 경 UDL characters  
갓 (Septets) , GSM 7bit Extension 도 동 니다. 그 8bit or UCS2 경  
Octets 갓 니다.

**6.5.4. TP User Data (TP UD)**

The length of the TP-User-Data field is defined in the PDU's of the SM-TL (see clause 9.2.2). The TP User Data field may comprise just the short message itself or a Header in addition to the short message depending upon the setting of TP UDHI.

Where the TP UDHI value is set to 0 the TP User Data field comprises the short message only, where the user data can be 7 bit (default alphabet) data, 8 bit data, or 16 bit (UCS2 [24]) data. Where the TP UDHI value is set to 1 the first octets of the TP User Data field contains a Header in the following order starting at the first octet of the TP User Data field.

Irrespective of whether any part of the User Data Header is ignored or discarded, the MS shall always store the entire TPDU exactly as received.

**Note:**

User Data 구 UDH 따라 [UDL+Text] or [UDL+UDHL+IEIn+Text] 나눠 ,  
또 각 DCS 따라 아 갓 encoding 됩니다.

The diagram below shows the layout of the TP-User-Data-Length and the TP-User-Data for uncompressed GSM 7 bit default alphabet data. The UDHL field is the first octet of the TP-User-Data content of the Short Message.

**Note:**

GSM 7bit 경 아 그 IEI Fill bits 랍니다.



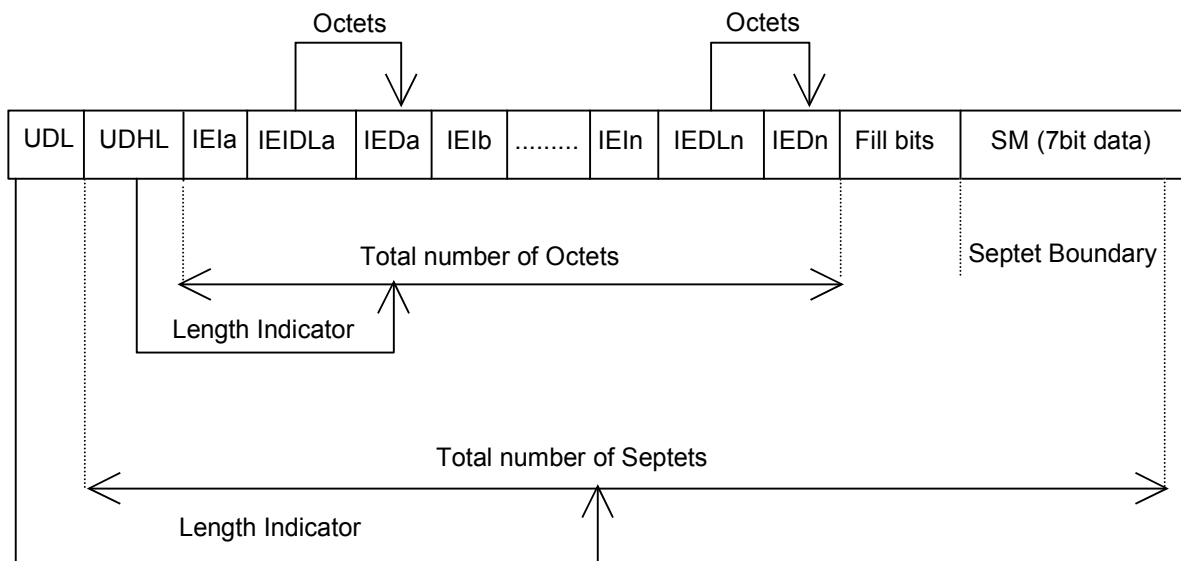


Figure 6.5 (a)

The diagram below shows the layout of the TP-User-Data-Length and the TP-User-Data for uncompressed 8 bit data or uncompressed UCS2 data. The UDHL field is the first octet of the TP-User-Data content of the Short Message.

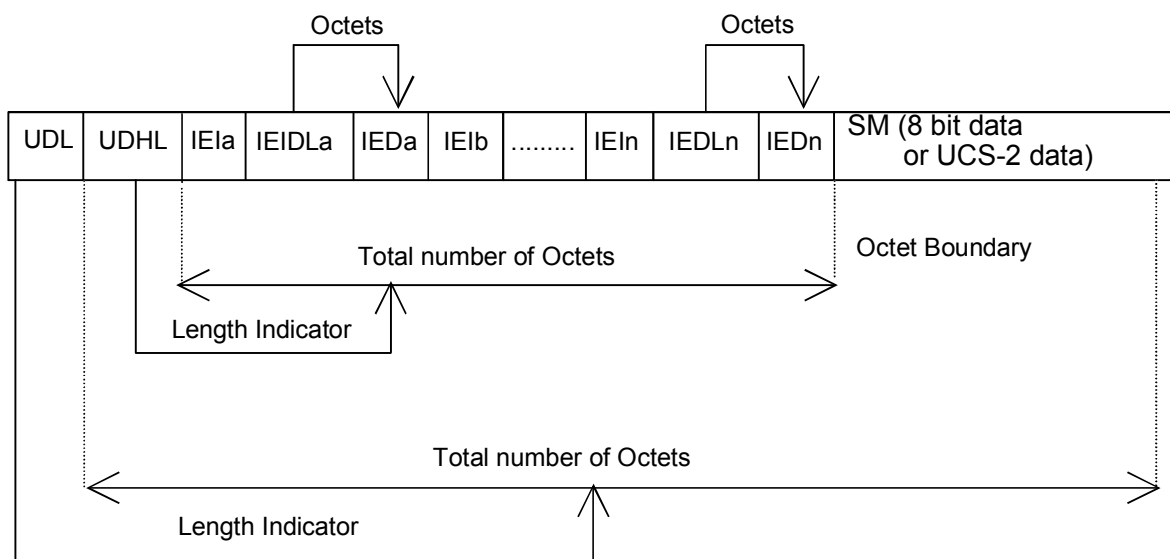


Figure 6.5 (b)

**Note:**

Data compress   나   Field 들   대  
고   랍니다.

3GPP TS 23.038, 3GPP TS 23.040

TP Message Type Indicator (TP MTI)  
TP More Messages to Send (TP MMS)



TP Status Report Indication (TP SRI)  
 TP Status Report Request (TP SRR)  
 TP Message Reference (TP MR)  
 TP Originating Address (TP OA)  
 TP Destination Address (TP DA)  
 TP Protocol Identifier (TP PID)  
 TP Data Coding Scheme (TP DCS)  
 TP Service Centre Time Stamp (TP SCTS)  
 TP Discharge Time (TP DT)  
 TP Recipient Address (TP RA)  
 TP Status (TP ST)  
 TP Reply Path (TP RP)  
 TP Message Number (TP MN)  
 TP Command Type (TP CT)  
 TP Command Data Length (TP CDL)  
 TP Command Data (TP CD)  
 TP Failure Cause (TP FCS)  
 TP-VP (Relative format)  
 TP-VP (Absolute format)  
 TP-VP (Enhanced format)

## 6.6. SMS Data Coding Scheme 따 TP-UD Encoding / Decoding

아 는 두 PDU 드 기 AT+CMGW( ) 되어 , AT+CMGS( )도  
 동 동 니다.

AT+CMGF=0  
 OK

### Example

- i. DCS (0x0C) - KSC5601 case :
- ii. DCS (0x0C) - KSC5601 case within the TP User Data Header :
- iii. DCS (0x08) - UCS2 case :
- iv. DCS (0x08) - UCS2 case within the TP User Data Header :
- v. DCS (0x00) - GSM 7BIT case :
- vi. DCS (0x00) - GSM 7BIT case within the TP User Data Header : Fill bit 0
- vii. DCS (0x00) - GSM 7BIT case within the TP User Data Header : Fill bit 5



### 6.6.1. Data Coding Scheme : KSC5601

#### i. DCS (0x0C) – KSC5601 case :

- A. MSG FORMAT - 0x11
  - TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
  - TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
- B. TP-MR : 0xFF (내 업데 됨)
- C. TP-DA : 0B811020694706F0 ( : 01029674600 )
- D. TP-PID : 0x00
- E. TP-DCS : 0x0C ( KSC5601 )
- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0A (Length 10)
  - SM : C7D1B1DBC5D7BDBAC6AE ( Text : 글 )

AT+CMGW=24

> 11FF0B811020694706F0000CA70AC7D1B1DBC5D7BDBAC6AE  
+CMGW: 2

OK

#### ii. DCS (0x0C) – KSC5601 case within the TP User Data Header :

- A. MSG FORMAT - 0x51
  - TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
  - TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
  - TP-UDHI [ Bit6 (1) ] : TP UD field contains a Header
- B. TP-MR : 0xFF (내 업데 됨)
- C. TP-DA : 0B811020694706F0 ( : 01029674600 )
- D. TP-PID : 0x00
- E. TP-DCS : 0x0C ( KSC5601 )
- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0x11 (Length 17)
  - Reply Address Element (0x22)
    - ✓ 06 : TP-UDHL
    - ✓ 22 : IEI - Reply Address Element
    - ✓ 04 : IEIDL
    - ✓ 04 : Address Length
    - ✓ 81 : Type of Address
    - ✓ 01 40 : BCD Address (1004)
  - SM : C7D1B1DBC5D7BDBAC6AE (Text : 글 )

AT+CMGW=31



> 51FF0B811020694706F000CA71106220404810140C7D1B1DBC5D7BDBAC6AE  
+CMGW: 2

OK

## 6.6.2. Data Coding Scheme : UCS2

### iii. DCS (0x08) – UCS2 case :

- A. MSG FORMAT - 0x11
  - TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
  - TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
- B. TP-MR : 0xFF (내 업데 됨)
- C. TP-DA : 0B811020694706F0 ( : 01029674600 )
- D. TP-PID : 0x00
- E. TP-DCS : 0x08 ( UCS2 )
- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0x14 (Length 20)
  - SM : AC00AC0AAC1CAC40AC5CAC86AC9DACCCACEFAD06 ( Text : 가삼객갈겔겔겔겔겔겔 )

AT+CMGW=34

> 11FF0B811020694706F00008A714AC00AC0AAC1CAC40AC5CAC86AC9DACCCACEFAD06  
+CMGW: 2

OK

### iv. DCS (0x08) – UCS2 case within the TP User Data Header :

- A. MSG FORMAT - 0x51
  - TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
  - TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
  - TP-UDHI [ Bit6 (1) ] : TP UD field contains a Header
- B. TP-MR : 0xFF (내 업데 됨)
- C. TP-DA : 0B811020694706F0 ( : 01029674600 )
- D. TP-PID : 0x00
- E. TP-DCS : 0x08 ( UCS2 )
- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0x1B (Length 27)
  - Reply Address Element (0x22) – 06220404810140
    - ✓ 06 : TP-UDHL
    - ✓ 22 : IEI - Reply Address Element
    - ✓ 04 : IEIDL
    - ✓ 04 : Address Length



- ✓ 81 : Type of Address
- ✓ 01 40 : BCD Address (1004)
- SM : AC00AC0AAC1CAC40AC5CAC86AC9DACCCACEFAD06 (Text : 가값객갈겉겉겉겉겉겉겉 )

AT+CMGW=41

>

51FF0B811020694706F00008A71B06220404810140AC00AC0AAC1CAC40AC5CAC86AC9DACC  
CACEFAD06  
+CMGW: 2

OK

### 6.6.3. Data Coding Scheme : GSM 7bit

#### v. DCS (0x00) – GSM 7BIT case :

##### A. MSG FORMAT - 0x11

- TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
- TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format

##### B. TP-MR : 0xFF (내 업데 됨)

##### C. TP-DA : 0B811020694706F0 ( : 01029674600 )

##### D. TP-PID : 0x00

##### E. TP-DCS – 0x00 ( GSM 7BIT )

##### F. TP-VP : 0xA7 ( Dec 167 : 1 day)

##### G. TP-UD

- TP-UDL : 0x0A (Length 10)

- SM : 31D98C56B3DD703918 ( Text : 1234567890 )

Packing 3GPP TS 23.038 6.1.2 Character packing 고 랍니다.

AT+CMGW=23

> 11FF0B811020694706F00000A70A31D98C56B3DD703918

+CMGW: 2

OK

#### vi. DCS (0x00) – GSM 7BIT case within the TP User Data Header : Fill bit 0

##### A. MSG FORMAT - 0x51

- TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
- TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
- TP-UDHI [ Bit6 (1) ] : TP UD field contains a Header

##### B. TP-MR : 0xFF (내 업데 됨)

##### C. TP-DA : 0B811020694706F0 ( : 01029674600 )

##### D. TP-PID : 0x00

##### E. TP-DCS – 0x00 ( GSM 7BIT )



- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0x12 (Length 18)
  - Reply Address Element (0x22)
    - ✓ 06 : TP-UDHL
    - ✓ 22 : IEI - Reply Address Element
    - ✓ 04 : IEIDL
    - ✓ 04 : Address Length
    - ✓ 81 : Type of Address
    - ✓ 01 40 : BCD Address (1004)
  - SM : **31D98C56B3DD703918** ( Text : 1234567890 )

AT+CMGW=30

> **51FF0B811020694706F00000A7120622040481014031D98C56B3DD703918**  
+CMGW: 2

OK

vii. **DCS (0x00) – GSM 7BIT case within the TP User Data Header : Fill bit 5**

- A. MSG FORMAT - 0x51
  - TP-MTI [ Bit1 Bit0 (01) ] : SMS SUBMIT (in the direction MS to SC)
  - TP-VPF [ Bit4 Bit3 (10) ] : TP VP field present - relative format
  - TP-UDHI [ Bit6 (1) ] : TP UD field contains a Header
- B. TP-MR : 0xFF (내 업데이트 됨)
- C. TP-DA : 0B811020694706F0 ( : 01029674600 )
- D. TP-PID : 0x00
- E. TP-DCS : 0x00 ( GSM 7BIT )
- F. TP-VP : 0xA7 ( Dec 167 : 1 day)
- G. TP-UD
  - TP-UDL : 0x15 (Length 21)
  - Reply Address Element (0x22)
    - ✓ 08 : TP-UDHL
    - ✓ 22 : IEI - Reply Address Element
    - ✓ 06 : IEIDL
    - ✓ 08 : Address Length
    - ✓ 81 : Type of Address
    - ✓ 01 40 01 40 : BCD Address (10041004)
  - SM : **20269BD16AB61B2E0703** ( Text : 1234567890 )

AT+CMGW=33

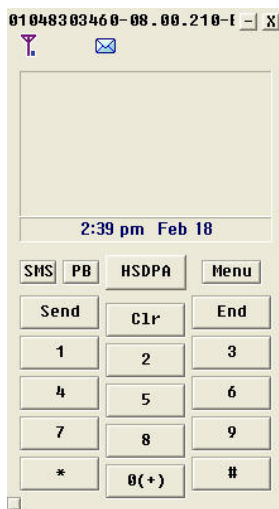
> **51FF0B811020694706F00000A71508220608810140014020269BD16AB61B2E0703**  
+CMGW: 2

OK



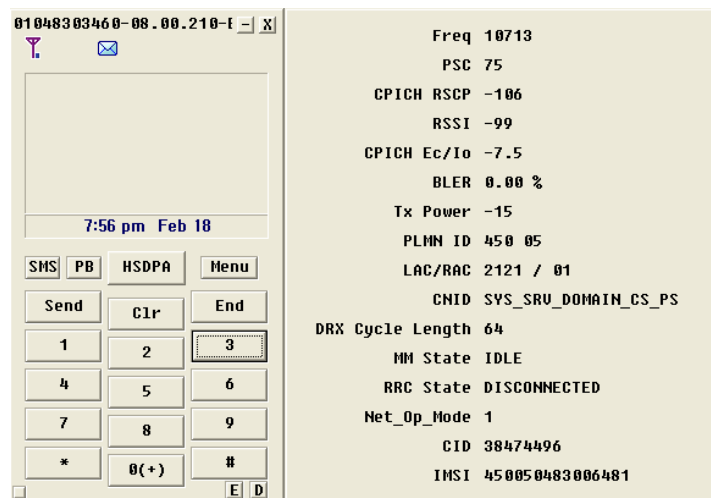
## 7. Debug Screen

### 7.1. Debug Screen



- Idle "#963" .

- 공 아 값 Debug Screen Display 됨.



- Debug Screen "D" Icon Click 가능.



## 7.2. PCwith\_SKT Debug Screen 기 구

```

Freq 10713
PSC 75
CPICH RSCP -109
RSSI -100
CPICH Ec/Io -9.0
BLER 0.00 %
Tx Power -15
PLMN ID 450 05
LAC/RAC 2121 / 01
CNID SYS_SRU_DOMAIN_CS_PS
DRX Cycle Length 64
MM State IDLE
RRC State DISCONNECTED
Net_Op_Mode 1
CID 38474496
IMSI 450050483006481

```

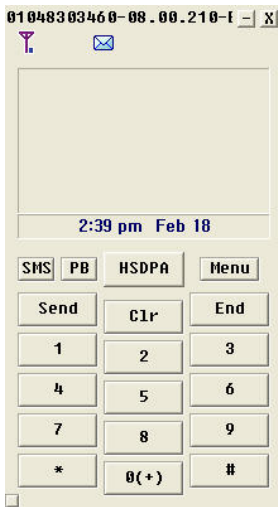
- IMSI : IMSI Value

- Freq : Serving Cell UARFCN
- PSC : Serving Cell Primary Scramble Code
- CPICH RSCP : Serving Cell RSCP value
- RSSI : Serving Cell RSSI
- CPICH Ec/Io : Serving Cell Ec/Io
- BLER : Current BLER %
- Tx Power : Current setting Tx power
- PLMN : APLMN
- LAC/RAC : Serving Cell LAC/RAC
- CNID : Service Domain Status
- DRX Cycle Length : Serving Cell DRX Value
- MM State : MM Layer State
- RRC State : RRC Layer State
- Net\_Op\_Mode : Current Network Operation Mode
- CID : Cell ID

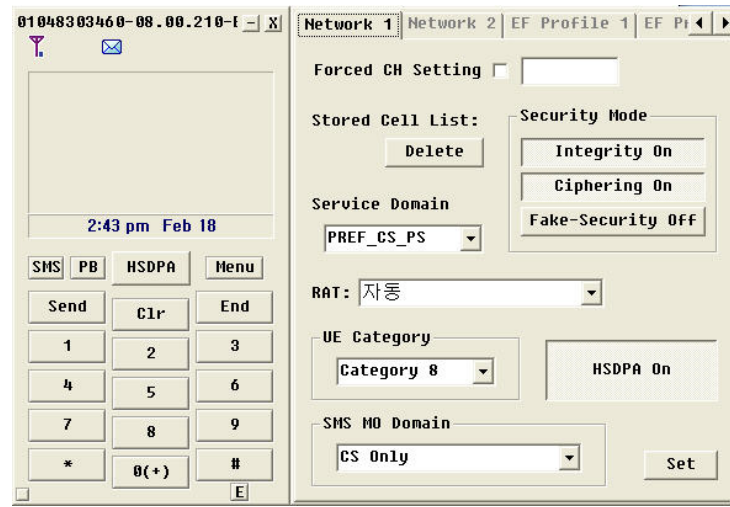


## 8. Engineer Mode

### 8.1. Engineer Mode



- Idle "369#" 누 Engineer Mode .
- 공 그 과 값 가 됨.



- Engineer Mode Menu "E" Icon Click 가능.

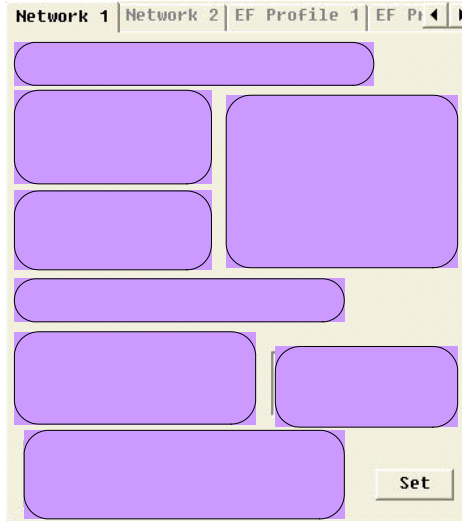
### 8.2. PCwith\_SKT Engineer Mode 기 구

- PCwith Tool Engineer Mode Engineer Mode 관 된 4 객 Tab 구 되어 .
  - Network 1
  - Network 2
  - EF Profile 1
  - EF Profile 2

- Tab 등 단 아 등 가능 .

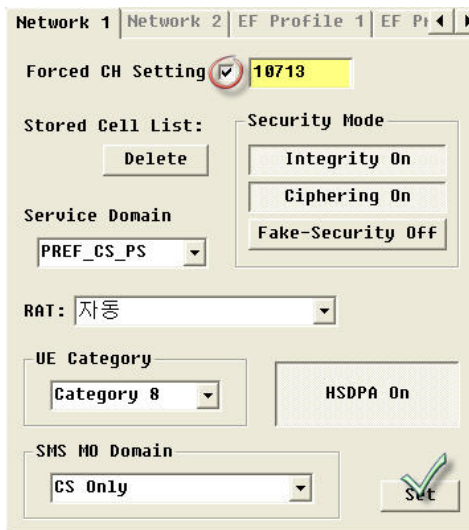








### 8.3. Network 1



- Force CH setting
- Store Cell List
- Service Domain
- Security Mode
- RAT
- UE Category
- HSDPA On/OFF
- SMS Mo Domain

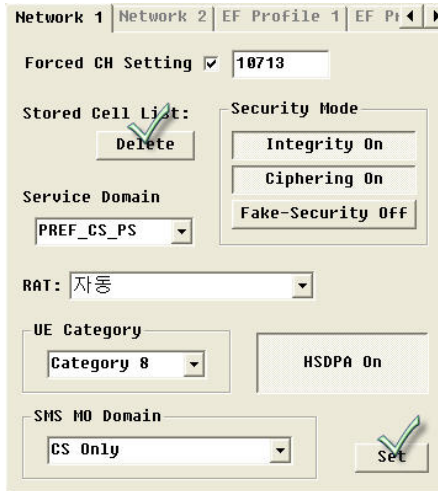
#### 8.3.1. Forced CH setting:



- 
  1. Check box  Check.
  2.  는 D/L UARFCN 값
  3. "Set" Button Click.
- 
  1. Check box  Check
  2. "Set" Button Click.
-  **AT Command**
  1. AT#CHFIX

#### 8.3.2. Stored Cell List: 된 Cell DB Clear

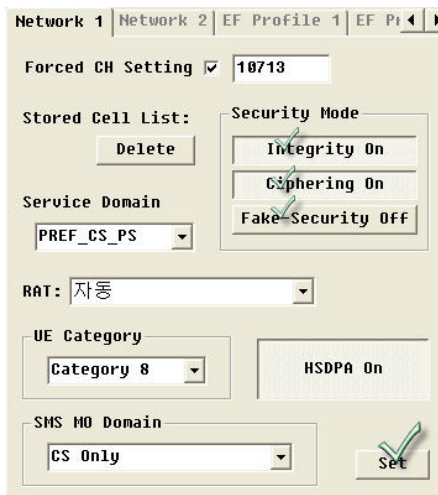




- **Stored Cell List Clear**
  1. Delete Button Click.
  2. "Set" Button Click.

- **관 AT Command**
  1. AT#EMCC

### 8.3.3. Security Mode: Security Mode Enable/Disable



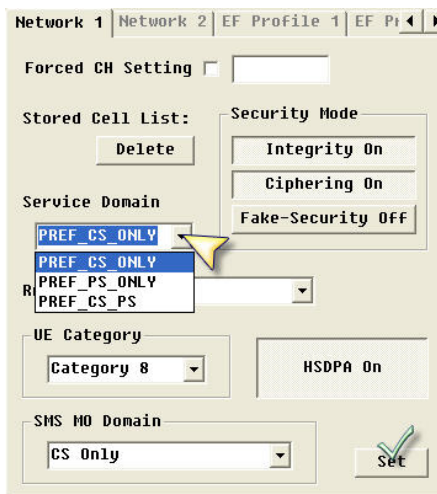
- **Security Mode Enable**
  2. Toggle to " Integrity On".
  3. Toggle to "Ciphering On".
  4. Toggle to "Fake-Security Off".

- **Security Mode Disable**
  1. Toggle to " Integrity Off".
  2. Toggle to "Ciphering Off".
  3. Toggle to "Fake-Security On".
  4. "Set" Button Click.

- **관 AT Command**
  1. AT#CHFIX



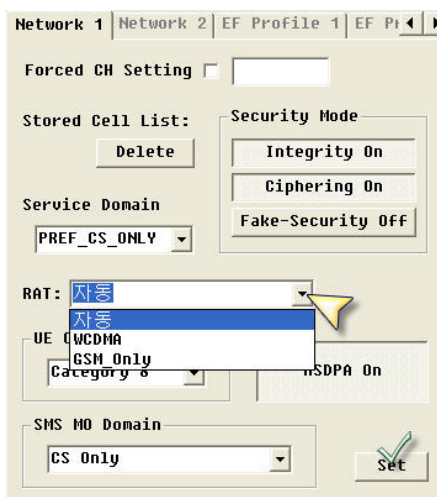
### 8.3.4. Service Domain: Service Domain Setting



- **Service Domain Setting**
  1. Service Domain Combo Box Click.
  2. ≡ Service Domaining .
  3. "Set" Button Click.

- **관 AT Command**
  1. AT+CGCLASS

### 8.3.5. RAT: RAT Setting

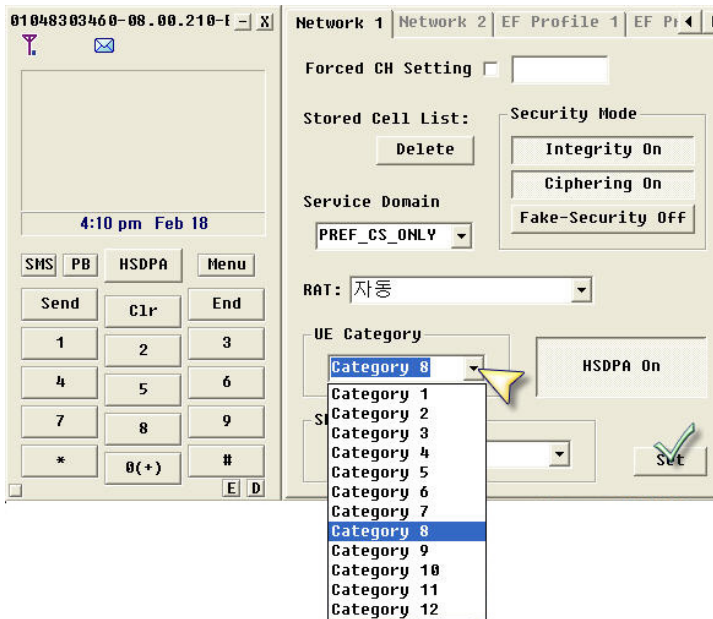


- **RAT Setting**
  1. RAT Combo Box Click.
  2. ≡ RAT .
  3. "Set" Button Click.

- **관 AT Command**
  1. AT+WS46

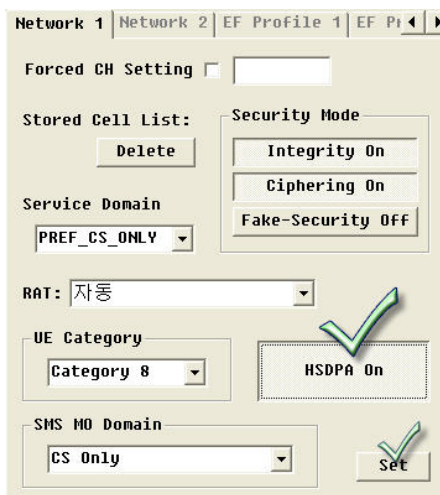


### 8.3.6. UE Category: WCDMA UE Category Setting



- **UE Category Setting**
  1. UE Category Combo Box Click.
  2. ≡ UE Category
  3. "Set" Button Click.
- **Default UE Category: Category 8.**
- **관 AT Command**
  1. AT#HSDPA

### 8.3.7. HSDPA: HSDPA On/Off Setting

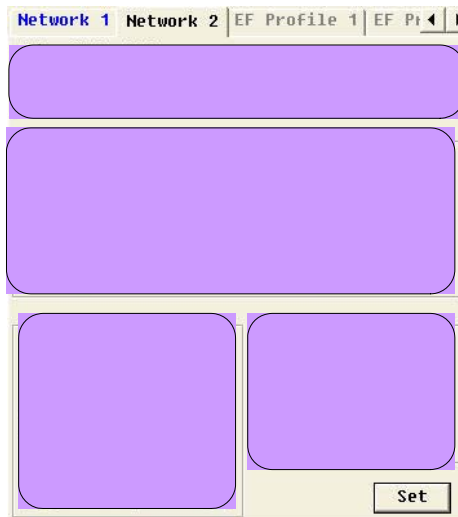


- **HSDPA On Setting**
  1. Toggle to "HSDPA On".
  2. "Set" Button Click.
- **HSDPA Off Setting**
  1. Toggle to "HSDPA Off".
  2. "Set" Button Click.
- **관 AT Command**
  1. AT#HSDPA



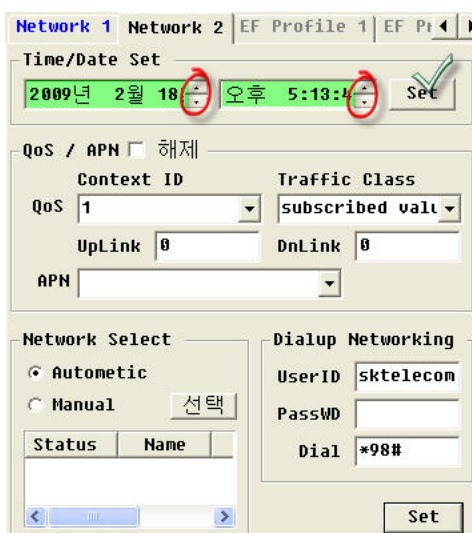


## 8.4. Network 2 ㄱ



- Time/Date Set
- QoS/APN Set
- Network Selection Mode Control
- Windows OS DUP Setting

### 8.4.1. Time/Date Setting



#### ■ Time/Date Setting

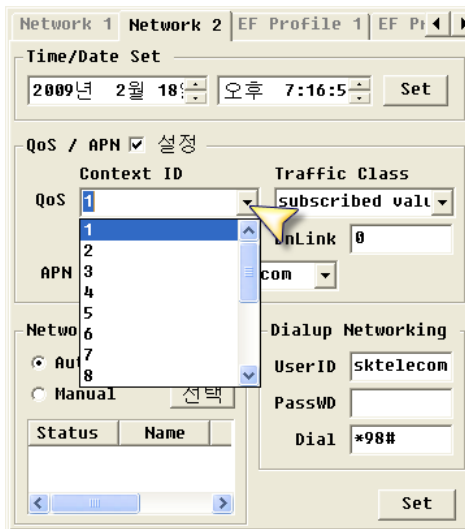
1. 는 날 간 Type 거나  
Up/Down Button
2. "Set" Button Click.

#### ■ 관 AT Command

1. AT+CCLK

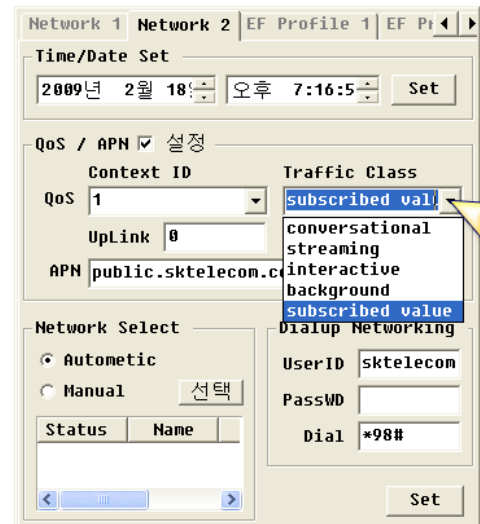


### 8.4.2. QoS/APN Setting



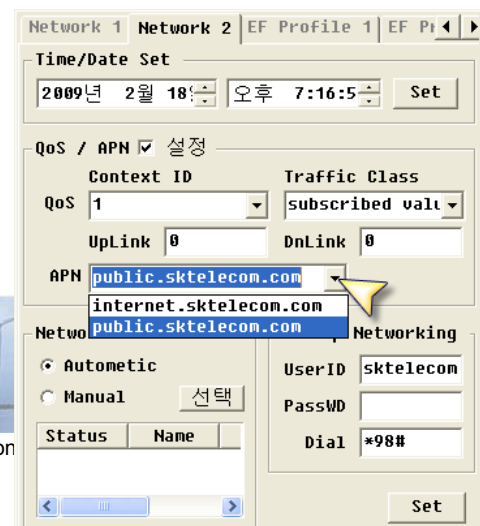
#### ■ QoS/APN Setting

1. QoS/APN Check Box Check.
2.  Context ID Click.
3.  Traffic Class Click.



#### 4. Request Uplink, Downlink Speed

kbps 단 .

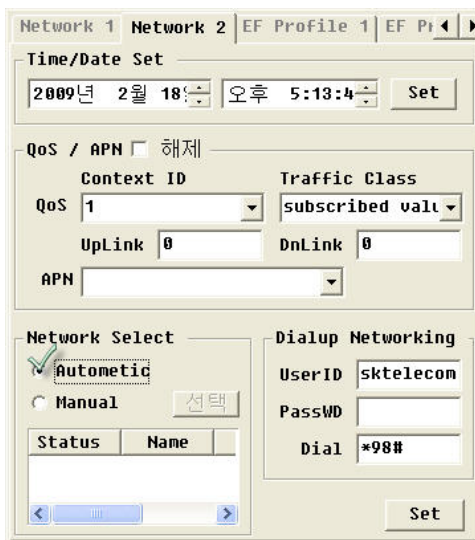


5. 는 APN 값 또는
6. "Set" Button Click.

■ 관 AT Command

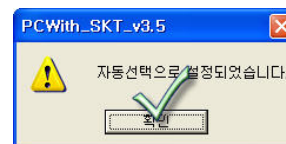
1. AT+CGDCONT, AT+CGEQREQ

### 8.4.3. Network Selection Mode Control



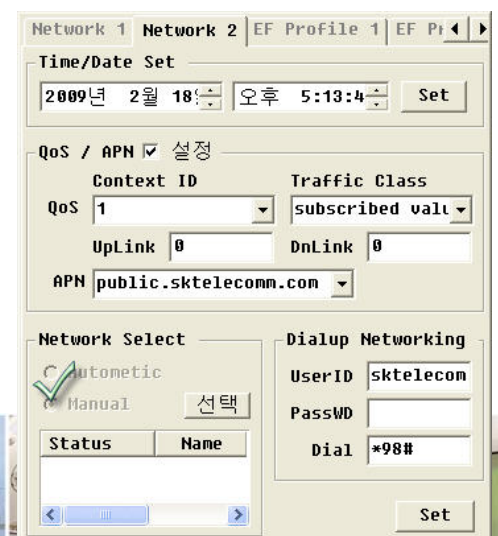
■ Automatic Mode Setting

1. Automatic Radio Button Click.
2. Pop-up "확인" Button Click.

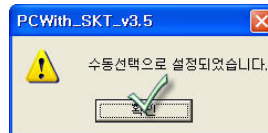
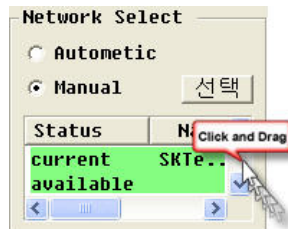


■ Manual Mode Setting

1. Manual Radio Button Click.
2. Modem Network Searching 끝날 때 까지 대기.



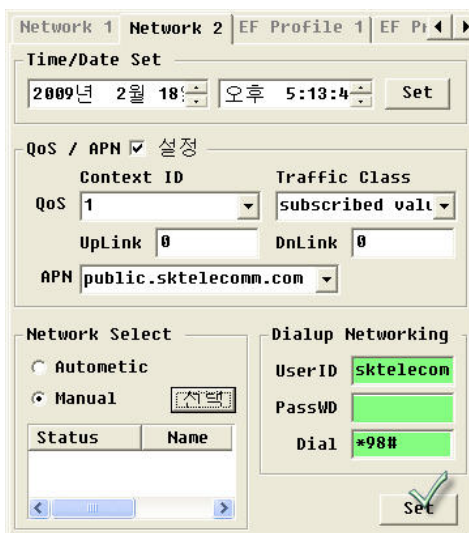
3. Network Searching 끝나 아 그 과  
값 Detect 된 Network 들 List up 됨.



4. Scroll Button 는  
Network Select " "  
Button Click.

5. Pup-up " "  
Button Click.

### 8.4.4. Dialup Networking Setting



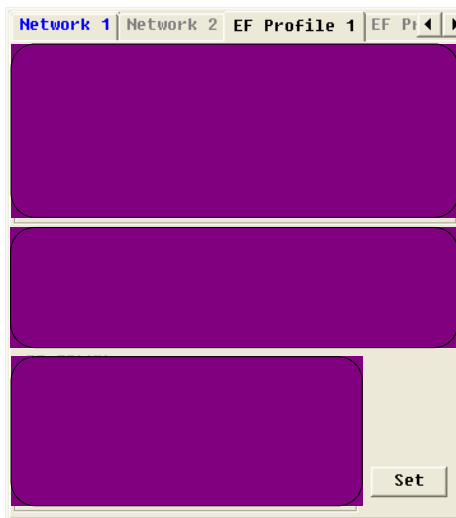
#### ■ Dialup Networking Setting

1. 는 User ID, Password

2. "Set" Button Click.

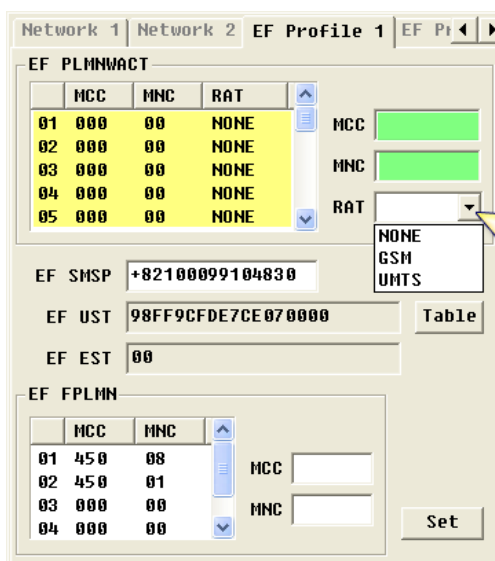


## 8.5. EF Profile 1



- EF\_PLMNWACT Read/Write
- EF\_SMSP(SMS Service Center Number) Read/Write
- EF\_UST(USIM Service Table) Read
- EF\_EST( Enabled Service Table) Read
- EF\_FPLMN Read/Write

### 8.5.1. EF\_PLMNWACT Read/Write



#### ■ EF\_PLMNWACT Read

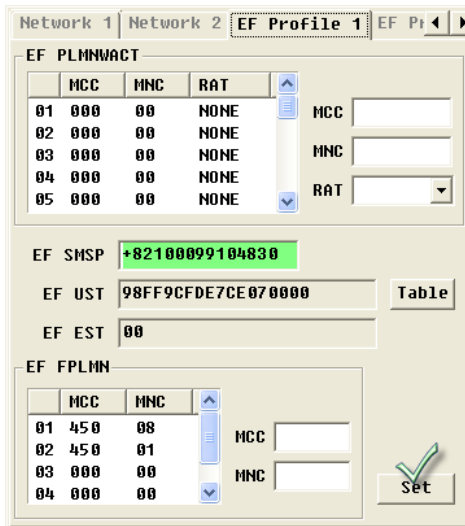
1. 기 Engineer Mode  
EF\_PLMNWACT 값  
어  
Display 됨.

#### ■ EF\_PLMNWACT Write

1. List Write 는 곳 Click
2. MCC, MNC Test Box 고  
는 MCC, MNC
3. RAT 는 RAT
4. "Set" Button Click.



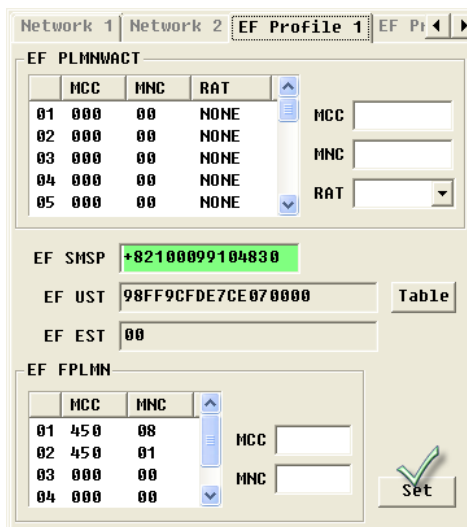
### 8.5.2. EF\_SMSP (SMS Service Center Number) Read/Write



- **EF\_SMSP(SMS Service Center Number) Read**
  1. 기 Engineer Mode SMS Center Number 값 어 Display 됨.

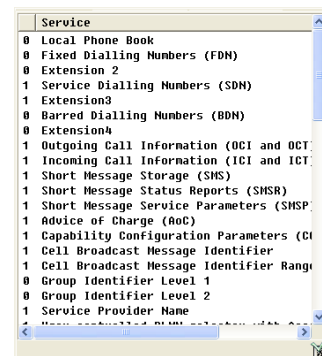
- **EF\_PLMNWACT Write**
  1. 는 SMS Center Number .
  2. "Set" Button Click.

### 8.5.3. EF\_UST, EF\_EST Read

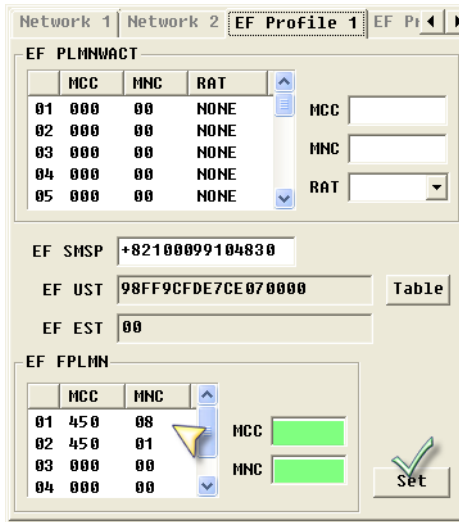


- **EF\_UST(USIM Service Table), EF\_EST(Enabled Service Table) Read**
  1. 기 Engineer Mode EF\_UST, EF\_EST 값 어 Display.

2. "Table" Button Click  
과 값 Service Table 나 .
3. 돌아가 "X" Click.



### 8.5.4. EF\_FPLMN Read/Write



#### ■ EF\_FPLMN Read

1. 기 Engineer Mode SIM FPLMN  
Field 어 Display .

#### ■ EF\_FPLMN Write

1. FPLMN List 는 곳 Click.
2. MCC, MNC Test Box 고 는  
MCC, MNC .
3. "Set" Button Click.



## 8.6. EF Profile 2

Network 2 | EF Profile 1 | EF Profile 2 | Rt ◀ ▶

EF ACMMax

EF LOCK\_ON\_OFF

EF CARD\_TYPE

EF LOCK\_IMEI

EF OPLMNWACT		
	MCC	MNC
01	440	20
02	454	00
03	502	12
04	525	01
05	466	97

EF HPLMNWACT		
	MCC	MNC
01	450	05
02	000	00
03	000	00
04	000	00
05	000	00

- EF\_ACMMax
- EF\_LOCK\_ON\_OFF Read
- EF\_CARD\_TYPE Read
- EF\_LOCK\_IMEI Read
- EF\_OPLMNWACT Read
- EF\_HPLMNWACT Read

- 기 Engineer Mode 관 된 든 EF Display



## 9. KTF OTA 객

### 9.1. Power On 단 기 객 동 구

Power On USIM 드 어 EF\_MSISDN NULL("FF" ) 거나 0 경 , 단 기 객 야 다.

MSISDN NULL("FF" ) 거나 0 경 , 들 기 #103 URC 낸다.  
단 Key Locking 동 / 기능 등 다.  
USIM 드가 Network 등 된 드 경 등 공 게 되고, Locking Idle 다.

Locking Idle 가 되 등 다.

- 1) 단 값 \*147359\*682\* 고, OTA Request 다.
- 2) OTA 기 단 들 게 OTA REQUEST command "#COMS=00" 낸다.
- 3) Network OTA data 고, SMS-PP DATA DOWNLOAD 과 USIM UPDATE 다. USIM UPDATE 가 되 , USIM UPDATE 가 되었 #105 URC 알 다.
- 4) 단 #105 , 단 Network 등 게 된다.

## 10. SKTelecom OTA 객

USIM 기 TYPE 따라 아 경 따라 객 드 고, OTA 객 다.

### 10.1. 공USIM (NO IMSI, NO MSISDN)

USIM 기 과 IMSI 값 NULL , USIM 기 과 단 고, INVALID USIM 알 다. SIM INVALID 고, IMSI 값 SIM FAILER 경 는 객 USIM 드 간 다.

- 1) Module power on
- 2) IMSI 값 NULL 드 경 , 기 과 들 #100:2 URC 낸다. 때 AT+CIMI 어 IMSI 값 +CME ERROR: 13 다. 때 AT#CCID USIM 업 가 SK Telecom USIM card 다.
- 3) #CCID 값 앞 6 가 다 과 값 SK Telecom USIM 나 낸다.  
"898205XXXXXXXXXXXXXXX"



- 4) SK Telecom USIM 이 "+CIMI" 값을 SIM Failer 경 는 객 USIM 드 나 낸다.
- 5) 따라 11.4 USIM 객 다.

### 10.2. 공USIM (IMSI, NO MSISDN)

USIM 기 과 IMSI 값을 고, SIM INIT COMPLET , MSISDN 값을 NULL 경 , 객 USIM 간 다.

- 1) Module power on
- 2) 기 과 , USIM 기 가 되 들 #100:0 URC 낸다. 기 가 끝난 CRSM Command MSISDN 는다. MSISDN NULL("FF" ) 거나 "0" 경 , 객 USIM 드 나 낸다.  
 ) MSISDN 는다.  
AT+CRSM=178,28480,1,4,0  
MSISDN "FF" 경  
+CRSM: 144,0,FF.  
MSISDN NULL 경  
+CRSM: 105,129 or +CRSM: 105,130
- 3) USIM 과 구 기 #CCID 값을 앞 6 가 다 과 값을 SK Telecom USIM 나 낸다. "898205XXXXXXXXXXXXXXX"
- 4) SK Telecom USIM 이 MSISDN 값을 NULL("FF" ) 또는 "0" 경 는 객 USIM 드 나 낸다.
- 5) 따라 11.4 USIM 객 다.

### 10.3. 드(IMSI, MSISDN)

USIM 기 과 IMSI 값을 고, SIM INIT COMPLET , MSISDN 값을 고 Call processing 가능 경 , 객 경 IDLE , Network 객 등 11.4 객 야 다.

### 10.4. Telit OTA 객

- 1) "AT#NTMGR=0" Command 객 드 다. 객 드는 NVM OTA MODE 1 , 들 다. "AT#REBOOT" Command 또는 Hard RESET 단 다.
- 2) OTA MODE 값을 1 되어 는 경 , 들 , USIM 기 과 들 IMSI\_P 기 다.
- 3) 들 IMSI\_P USIM 기 고, SIM INIT COMPLET 다. (#100:0)
- 4) SIM INIT 되 NVM OTA MODE 가 ENABLED 되었는 고, OTA REQUEST 다.



- AT#NTMGR?  
#NTMGR: 1 (NVM MODE 1, 객 드 READY )
- 5) "AT#NTMGR=1" OTA 객 다. 때 NVM 0 되고, OTA MODE DISABLE 다.
  - 6) OTA 객 기 들 Network OTA data REQUEST 기 PS ATTACH 도 다.
  - 7) PS ATTACH REJECT(#308:7) 고 CS ATTACH 도 NETWORK SMS-PP DATA DOWNLOAD DATA 고, USIM UPDATE 다. 약 등 되 않 IMEI 경 ILLEGAL MS(#308:3) 고, OTA 단 다.
  - 8) Network OTA data 고, SMS-PP DATA DOWNLOAD 과 USIM UPDATE 다. USIM UPDATE 가 되 , USIM UPDATE 가 되었 #105 URC 알 다.
  - 9) 단 #105 , 단 Network 등 게 된다.



## 11. Document Change Log

Revision	Date	Changes
ISSUE #0	30/03/09	First release

