Sudan University of Science &Technology

College of Post Graduate Studies

Faculty of Engineering &Technology

Department of Electronic Engineering

SMS mangement using AT commands

ادارة الرسائل النصية القصيرة باستخدام اوامر ال AT

A Thesis Submitted in Partial Fulfillment of the Requirements for Degree of M.Sc in Telecommunication Engineering

Prepared By: Ahmed Ibrahim Ahmed Abdelkareem

Supervisor: Dr. Abd Elrasoul Gabar Alzubaidi

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ا لايــة : -

قال تعالي :

{قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَاۖ إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ }

صدق الله العظيم

الاية (٣٢)سورة البقرة

Dedication

I dedicate this research to all knowledge seckers
May you benfit from it.

To all my Family, for there unlimited support.

To the memory of my father, my sister and all the beloved ones
may you rest in heaven.

ACKNOWLEDGEMENT

First of all, I would like to thanks Allah for shedding on me good health and keeping my brain working to the extent completing this research.

Next, to the Center of Engineering And Technical Studies (CETS) and many thanks to my supervisor Dr. Abd Elrasoul Gabar Alzubaidi , especially, I would like to sincerely thank him for his valuable advice and the continuous effort that exerted while I was carrying out this study.

Sincere appreciation goes to my parents, wife,son, brothers, sisters and all my friends.

ABSTRACT

This project will focus on developing an enhancement of the computer ability to manage SMS.

Telecommunication getting involved in the everyday life of every person, SMS & AT commands in particular were a transforming technologies. They didn't change people way of communication only, but the way PC's communicate too. Which made the Idea of o this project interesting area to explore.

The Project "Managing SMS using AT commands", aiming to build a computer program that is able to send AT commands to GSM modem to control it for Short Message service, sending, receiving, deletion.. etc.
Program will built using Matlab, C# and VB, will communicate with serial port, initialize the port then send the AT commands and read the response from the serial port and throw it back to the program.

Expected results will be the three running programs that are able to communicate with GSM modem by using AT commands, a comparison table to be built for the results.

المستخلص

يركز هذا المشروع على تطوير وتعزيز القدرة على إدارة جهاز الكمبيوتر لخدمة الرسائل النصية.

الاتصالات اصبحت جزا من الحياة اليومية لكل شخص ، والرسائل القصيرة و أوامر AT بشكل خاص كانت تكنولوجيات فارقة . أنها لم تغير وسيلة اتصالات الناس فقط ، ولكن في طريقة تواصل الحواسيب أيضا. الأمر الذي جعل فكرة البحث في هذا المشروع مثيرة للاهتمام والاستكشاف.

مشروع "إدارة الرسائل النصية القصيرة باستخدام أوامر AT " يهدف إلى بناء برنامج كمبيوتر قادر على إرسال أوامر AT لمودم (جي إس إم) للسيطرة عليها ل خدمة الرسائل القصيرة، و إرسالها واستلامها ، حذف .. الخ

و البرنامج سوف يبنى باستخدام Matlab، C# و VB ، والتواصل مع المنفذ تسلسلي ، لتهيئة الميناء ومن ثم اراسل الأوامر AT وقراءة استجابة من المنفذ التسلسلي وارجاعها مرة أخرى إلى البرنامج .

النتائج المتوقعة من المشروع انشاء برامج تشغيل قادرة على التواصل مع مودم (جي إس إم) باستخدام أوامر AT ، مع جدول للمقارنة لاحتوا النتائج .

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HUAWEI UMTS Datacard/Modem AT Command Interface Specification

4 SMS Interface Description

4.1 Select the SMS type +CSMS

4.1.1 Command Syntax

Command Possible response(s)

+CSMS=<service> <CR><LF>+CSMS:
<mt>,<mo>,<bm><CR><LF><CR><LF>OK<CR><LF>
+CSMS?
<CR><LF>+CSMS:
<service>,<mt>,<mo>,<bm><CR><LF><CR><LF>OK<
CR><LF>

Command Possible response(s)

+CSMS=? <CR><LF>+CSMS: (list of supported
<service>s)<CR><LF><CR><LF>OK<CR><LF>

4.1.2 Description

The SET command is used to set the message service type. The returned <mt>, <mo> and <bm> mean whether this service type is supported for the messages received by the terminal, messages sent by the terminal, and the broadcast messages.

4.2 Set message format +CMGF

4.2.1 Command Syntax

Command Possible response(s)

+CMGF[=<mode>] <CR><LF>OK<CR><LF>
+CMGF? <CR><LF>+CMGF:
<mode><CR><LF><CR><LF>OK<CR><LF>
+CMGF=? <CR><LF>+CMGF: (list of supported
<mode>s)<CR><LF><CR><LF>OK<CR><LF>

4.2.2 Description

The SET command is used to set the format of the short message. The format has two modes, and depends on the <mode> parameter. The two modes are: PDU mode and text mode. The “text” mode is unable to display Chinese, so currently, only the PDU mode is used. For the format of message in the PDU mode, see also “+CMGS command”.

The READ command is used to return the current mode selection.

The TEST command returns the applicable <mode> values.

4.2.3 Defined Values

<mode>:

0 PDU mode
1 text mode not supported currently.
If no <mode> is included, it is equivalent to the effect that the <mode> is 0.

4.3 Message arrival indication +CMTI

4.3.1 Command Syntax

Command Possible response(s)

<CR><LF>+CMTI: <mem>,<index><CR><LF>

4.3.2 Description

Indicate that a new message (or new message report) is received.

4.3.3 Defined Values

<mem>: Currently, only “SM” is supported.

"BM" Broadcast message storage
"ME" ME message storage
"MT" ME-associated storage
"SM" (U)SIM message storage
"TA" TA message storage
"SR" State report storage
<index>: Integer value, which indicates the position in the storage.

4.4 Indication of new message reported directly +CMT

4.4.1 Command Syntax

Command Possible response(s)

<CR><LF>+CMT:
[<reserved>],<length><CR><LF><pdu><CR><LF>

4.4.2 Description

Received new messages are not stored, but reported to TE directly.

4.5 Newly received message state report +CDSI

4.5.1 Command Syntax

Command Possible response(s)

<CR><LF>+CDSI: <mem>,<index><CR><LF>

4.5.2 Description

Indicate that a new message state report is received, and specify the storage position.

4.5.3 Defined Values

<mem>: Currently, only “SM” is supported.
"SM" (U)SIM message storage
<index>: Integer value, which indicates the position in the storage.

4.6 Indication of new message state report reported directly +CDS

4.6.1 Command Syntax

Command Possible response(s)

<CR><LF>+CDS: <length><CR><LF><pdu><CR><LF>

4.6.2 Description

Received new messages are not stored, but reported to TE directly.

4.7 New message notification setting +CNMI

4.7.1 Command Syntax

Command Possible response(s)

+CNMI=[<mode>[,<
mt>[,<bm>[,<ds>[,
<bfr>]]]]]
<CR><LF>OK<CR><LF>
In case of SMS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CNMI?
<CR><LF>+CNMI:
<mode>,<mt>,<bm>,<ds>,<bfr><CR><LF><CR><LF>OK<CR
><LF>
+CNMI=?
<CR><LF>+CNMI: (list of supported <mode>s),(list of
supported <mt>s),(list of supported <bm>s),(list of supported
<ds>s),(list of supported <bfr>s)
<CR><LF><CR><LF>OK<CR><LF>

4.7.2 Description

The “SET” command is used to set the program of reporting new message to TE, where,
<mode> and <bfr> are used to set the mode of reporting the new message notification (including four types: +CMT, +CMTI, +CDSI, +CDS) to the TE.

<mt> is used to set whether reporting the new message to the TE, or storing the new message in the MS and reporting the storage position when a new message is received.

<bm> is not in use currently.
<ds> is used to set whether to report the message state report (+CDSI, +CDS).
The TEST command returns the supported parameter values.
Note: The set value of this command will be cleared to 0 after the MS is restarted. In this case, no new message will be reported. The “AT+CNMI=0,0,0,0,0” mode is not recommended.

4.7.4 Informative Examples

For example, set CNMI=1,1,0,1,0.
It indicates that the new class1 messages will be stored in the MS first, and the storage position will be reported (+CMTI: ME,1}; the message state reports will be reported directly (+CDS:).
When it is impossible to report the message notification (e.g. when in the online data mode), the message notification will be discarded.

4.8 Delete Message +CMGD

4.8.1 Command Syntax

Command Possible response(s)
+CMGD=<index>[,<delfla
g>]
<CR><LF>OK<CR><LF>
In case of SMS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CMGD=?
<CR><LF>+CMGD: (list of supported <index>s)[,(list of
supported
<delflag>s)]<CR><LF><CR><LF>OK<CR><LF>

4.8.2 Description

EXECUTION command deletes message from memory <mem1> location <index>.
For the setting of <mem1> and description, see the “+CPMS command”. If the second parameter <delflag> is present and not set to 0 then the ME shall ignore <index> and follow the rules for <delflag> shown below. If deleting fails, +CMS ERROR: <err> is returned.
TEST command returns the valid memory locations and the supported values of <delflag>.
The TEST command returns the storage position where the message is currently stored, and the supported <delflag> values.

4.9 New Message Acknowledgement to +CNMA

4.9.1 Command Syntax

Command Possible response(s)
+CNMA[=<n>[,<length>[<CR
>
PDU is given<ctrl-Z/ESC>]]]
<CR><LF>OK<CR><LF>
In case of SMS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CNMA=? <CR><LF>+CNMA: (list of supported
<n>s)<CR><LF><CR><LF>OK<CR><LF>

4.9.2 Description

EXECUTION command confirms reception of a new message which is routed directly to the TE. This acknowledgement command shall be used when +CSMS parameter <service> equals 1. For the usage of this command, see also description of “+CNMI” command.
In PDU mode, it is possible to send either positive (RP-ACK) or negative (RP-ERROR) acknowledgement to the network. Parameter <n> defines which one will be sent. Optionally, an acknowledgement TPDU (SMS-DELIVER-REPORT for RP-ACK or RP-ERROR) may be sent to the network. The entering of PDU is done similarly as specified in command Send Message +CMGS, except that the format of <ackpdu> is used instead of <pdu>. PDU shall not be bounded by double quotes.
MS shall not send another +CMT or +CDS result code to TE before previous one is acknowledged.
If ME does not get acknowledgement within required time (network timeout), ME

should send RP-ERROR to network, and should shall automatically disable routing to TE by setting both <mt> and <ds> values of +CNMI to zero.
To make the MS report the message notification again, you need to set <mt> and <ds> again.
If the command is executed but no message is available for confirmation, the “+CMS ERROR” will be returned: <err>

The TEST command returns the supported <n> values. If only 0 is supported, it indicates that the command does not support TPDU sending.

4.10 Message storage selection +CPMS

4.10.1 Command Syntax

Command Possible response(s)

+CPMS=<mem1>[,
<mem2>[,<mem3>]]
<CR><LF>+CPMS:
<used1>,<total1>,<used2>,<total2>,<used3>,<total3><
CR><LF><CR><LF>OK<CR><LF>
In case of MS-related error:
<CR><LF>+CME ERROR: <err><CR><LF>

Command Possible response(s)
+CPMS?
+CPMS:
<mem1>,<used1>,<total1>,<mem2>,<used2>,<total2>,
<mem3>,<used3>,<total3><CR><LF><CR><LF>OK<
CR><LF>
In case of MS-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
+CPMS=?
+CPMS: (list of supported <mem1>s),(list of supported
<mem2>s),
(list of supported
<mem3>s)<CR><LF><CR><LF>OK<CR><LF>

4.10.2 Description

The SET command is used to set the message storage media corresponding to the message read/write operations, and return the current use state of the selected media.
The READ command returns the name and use state of the currently selected media.
The TEST command returns all the media types supported by the MS.

4.11 Reporting message storage media being full ^SMMEMFULL

4.11.1 Command Syntax

Command Possible response(s)

<CR><LF>^SMMEMFULL:<mem_type><CR><LF>

4.11.2 Description

When the message storage media overflow, the event will be reported automatically.

4.11.3 Defined Values

<mem_type>:
String value. It indicates the type of the overflowing media.
“SM”, which means the (U)SIM card.
“ME”, which means NV

4.12 SMSC number command +CSCA

4.12.1 Command Syntax

Command Possible response(s)

+CSCA=<sca>[,<tosca>]
<CR><LF>OK<CR><LF>
In case of MS-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
+CSCA?
<CR><LF>+CSCA:

<sca>,<tosca><CR><LF><CR><LF>OK<CR><LF>
In case of MS-related error:
<CR><LF>+CME ERROR: <err><CR><LF>
+CSCA=? <CR><LF>OK<CR><LF>

4.12.2 Description

The SET command is used to set the SMSC number. For the message in the PDU mode, the setting of this command can be used only if the SMSC-related parameter sc_len has the value of 0 (for the PDU format, see the “+CMGS” command) in the PDU.

4.12.3 Defined Values

<sca>:
String value. It indicates the SMSC number. The number is composed “*”, “+”, “#” and “0”-“9”. The number contains 20 characters at most.

<tosca>:
Integer value. It indicates the number type, where “145” means an international call. For the specific values, see also the definition of the “type_addr” parameter in the SC number, as described in the section “Short message sending +CMGS”.
If no <tosca> parameter is included, it is equivalent to the effect that the <tosca> parameter is not modified.

4.13 Message sending +CMGS

4.13.1 Command Syntax

Command Possible response(s)
+CMGS=<length><CR>
PDU is given<ctrl-Z/ESC>
<CR><LF>+CMGS:
<mr>[,<ackpdu>]<CR><LF><CR><LF>OK<CR><LF>
In case of SMS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CMGS=? <CR><LF>OK<CR><LF>

4.13.2 Interface Description

Send a message to the network side. The process of sending a message includes two steps:
First, deliver “+CMGS=<length>” ended with (CR).
After MS returns <CR><LF><greater_than><space>(IRA 13, 10, 62, 32), the TE delivers the PDU packet, which is ended with <ctrl-Z>(IRA 26).

4.13.4 Examples

The SMSC number is: 13902900, and the message is sent to the number: 13901000453, and the contents are: 0x53 0x4E 0x4E 0x3A (“华为” for UCS2 encode), then:
If “+CSCA” has set SCA, then
a) When sending the message, the <SCA> field can be left uncompleted. The <SCA> value is obtained through the value set via “+CSCA” command.
AT+CMGS=17(CR)
>81000B813109010054F3001804534E4E3A \x1A

Note: Data interpretation, 81(<RP~MTI>)00(<MR>)0B(<DA-len>)81(<DA-type>)3109010054F3(<DA-numbers>)00(<PID>)18(<DCS>)04(<UDL>)534E4E3A(<UD>)\x1A(<ctrl-Z>)
b) When sending the message, the <SCA> field can also be completed, and the <SCA> value can be obtained directly from the PDU packet.
AT+CMGS=17
>05a13109920081000B813109010054F3001804534E4E3A \x1A
or
AT+CMGS=17
>0081000B813109010054F3001804534E4E3A \x1A
(In this case, since <sc_len>=0,when sending the message, the <SCA> can be obtained through the value set via the “+CSCA” command)
If “+CSCA” has not set SCA, then
When sending the message, the <SCA> field must be completed, and the <SCA>

value can be obtained directly from the PDU packet.
AT+CMGS=17
>05a13109920081000B813109010054F3001804534E4E3A \x1A

4.14 Message storage command +CMGW

4.14.1 Command Syntax

Command Possible response(s)

+CMGW=<length>[,<stat>]<C
R>***PDU is given***<ctrl-Z/ESC>
<CR><LF>+CMGW:
<index><CR><LF><CR><LF>OK<CR><LF>
In case of SMS-related error:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CMGW=? <CR><LF>OK<CR><LF>

4.14.2 Interface Description

Store a message to the <mem2> storage set via the “+CPMS” command.

4.15 Message list command +CMGL

4.15.1 Command Syntax

Command Possible response(s)

+CMGL[=<stat>]
In case of pdu mode and successful execution of command:
[<CR><LF>+CMGL:
<index>,<stat>,[<reserved>],<length><CR><LF><pdu>
[<CR><LF>+CMGL:<index>,<stat>,[<reserved>],<length><CR
><LF><pdu>
[...]]<CR><LF>]<CR><LF>OK<CR><LF>
Otherwise:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CMGL=? <CR><LF>+CMGL: (list of supported <stat>s)
<CR><LF><CR><LF>OK<CR><LF>

4.15.2 Description

The EXECUTION command returns all messages from <mem1>, which are in the state specified by the parameter <stat>. If the message state is “Unread message that has been received”, the state of the message in the storage will be converted to “Read message that has been received” after the command is executed successfully.
When the <stat> takes on the default value, the EXECUTION command is equivalent to the SET command +CMGL=0.
The TEST command returns all the supported stat values.

4.16 Read a message +CMGR

4.16.1 Command Syntax

Command Possible response(s)

+CMGR=<index>
In case of pdu mode and successful execution of command:
<CR><LF>+CMGR:
<stat>,[<reserved>],<length><CR><LF><pdu><CR><LF><C
R><LF>OK<CR><LF>
or:
<CR><LF>+CMS ERROR: <err><CR><LF>
+CMGR=? <CR><LF>OK<CR><LF>

4.16.2 Description

The EXECUTION command returns the messages whose storage position is “index” from <mem1>. If the message state is “Unread message that has been received”, the state of the message in the storage will be converted to “Read message that has been received” after the command is executed successfully.
The TEST command returns OK.

4.16.3 Defined Values

<index>: Integer value, which indicates the position in the storage.
<stat> Message type:
0 Unread message that has been received
1 Read message that has been received

2 Unsent message that has been stored
3 Sent message that has been stored
<reserved>: Reserved.
<length>: Integer value, which indicates the number of bytes of PDU data.
<pdu>: Protocol data unit. Its format is the same as defined in section “Message list command”.

4.17 Message bearer domain command +CGSMS

4.17.1 Command Syntax

Command Possible response(s)

+CGSMS=<service> <CR><LF>OK<CR><LF>
+CGSMS? <CR><LF>+CGSMS:<service><CR><LF><CR><LF>OK<C
R><LF>
+CGSMS=? <CR><LF>+CGSMS: (list of supported
<service>s)<CR><LF><CR><LF>OK<CR><LF>

4.17.2 Description

The SET command is used to set the message bearer domain, namely, selection of CS/PS domain.
The READ command returns the current message bearer domain.

The TEST command returns the supported parameter values.

4.18 More Messages to Send +CMMS

4.18.1 Command Syntax

Command Possible response(s)

+CMMS=[<n>] <CR><LF>OK<CR><LF>
+CMMS? <CR><LF>+CMMS:<n><CR><LF><CR><LF
>OK<CR><LF>
+CMMS=? <CR><LF>+CMMS: (list of supported
<n>s)<CR><LF><CR><LF>OK<CR><LF>

4.18.2 Description

Set command controls the continuity of SMS relay protocol link. When feature is enabled (and supported by network) multiple messages can be sent much faster as link is kept open.
Test command returns supported values as a compound value.

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Abbreviations

SMS	Short Message Service
SM	Short Message
SMC	Short Message Center
SMSC	Short Message Service (Schedule) Center
MS	Mobile Station
MSC	Mobile Switch Center
HLR	Home Location Register
VLR	Visit Location Register
SMGW	Short Message Gate Way
DCS	Data Coding Scheme
ETSI	European Telecommunication Standardization Institute
GSM	Global System for Mobile Communication
MSISDN	Mobile Subscriber ISDN (Telephone number or address of device)
MS	Mobile Station
PCI	Protocol Control Information
PLMN	Public Land Mobile Network
PDU	Protocol Data Unit
TCAP	Transaction Capability Application Part
UDCP	USSD Dialogue Control Protocol
UDH	User-Data Header (see [GSM 03.40])
UDHL	User-Data Header Length (see [GSM 03.40])
UDL	User-Data Length (see [GSM 03.40])
USSD	Unstructured Supplementary Service Data
AT	Attention command

Chapter One

Introduction

Chapter Two

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Chapter Five

Conclusion & Recommendations