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Version History

Date	Version	Description	Owner
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1. Bluetooth Function

1.1. Bluetooth Introduction

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creatingpersonal area networks (PANs) with high levels of security.
Bluetooth was standardized as IEEE 802.15.1

1.2. Bluetooth Profile

To use Bluetooth wireless technology, a device has to be able to interpret certain Bluetooth profiles, which are definitions of possible applications and specify general behaviors that Bluetooth enabled devices use to communicate with other Bluetooth devices. These profiles include settings to parametrize and to control the communication from start. Adherence to profiles saves the time for transmitting the parameters anew before the bi-directional link becomes effective. There are a wide range of Bluetooth profiles that describe many different types of applications or use cases for devices

Besides of all profiles, there have four basic ones, they are GAP/SDAP/SPP/GOEP Profile.

1.3. Bluetooth Device address

The Bluetooth device address stores the network address of a Bluetooth–enabled device. It is used to identify a particular device during operations such as connecting to, pairing with, or activating the device.
A Bluetooth–enabled device address is a unique, 48–bit address containing the following three fields:

- LAP field: lower part of the address containing 24 bits.
- UAP field: upper part of the address containing 8 bits.
- NAP field: non–significant part of the address containing 16 bits.

The LAP and the UAP represent the significant address part (SAP) of the Bluetooth device address.

1.4. AT interface for Bluetooth function

As module solution, we provide series of AT interface to operate Bluetooth function, including pairing, bonding, pushing or receiving file.

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Also including interface for SPP service, which could communicate between Bluetooth device and others via serial port.

2. AT Interface

Command	Description
AT+BTHOST	Inquiry and set host device name
AT+BTSTATUS	Inquiry current BT device status
AT+BTPOWER	Power On or power off BT Radio
AT+BTPAIR	Pair BT device
AT+BTSCAN	Scan surrounding BT device
AT+BTUNPAIR	Unpair BT device
AT+BTCONNECT	Connect paired BT device
AT+BTDISCONN	Disconnect BT device
AT+BTGETPROF	Get profile provided by paired device
AT+BTACPT	Accept connecting request
AT+BTOPPACPT	Accept OPP service
AT+BTOPPPUSH	Push OPP object to paired device
AT+BTSPPSEND	Send data to BT serial port as client based on SPP service
AT+BTSPPGET	Get data from BT serial port as client based on SPP service
AT+BTATA	Answer incoming call
AT+BTATDL	Dial last dialed number
AT+BTATH	Hung up voice call
AT+BTVGS	Configure voice volume
AT+BTVGM	Configure MIC volume
AT+BTATD	Dial up a voice call
AT+BTRSSI	Get paired device's RSSI

2.1. AT+BTHOST Inquiry and set host device name

AT+BTHOST	
Test command **AT+BTHOST=?**	Response **+BTHOST: (**1,max length of the device **<name>)** **OK**
Read command **AT+BTHOST?**	Response **+BTHOST: <name>, <address>**

	OK
Write command **AT+BTHOST=<name>**	Response **OK**
	Parameter **<name>** device name **<address>** device address
Note	Max. length is 18 bytes,and display in UTF-8 code.

2.2. AT+BTSTATUS Inquiry current BT device status

AT+BTSTATUS	
Test Command **AT+BTSTATUS=?**	Response **OK**
Read Command **AT+BTSTATUS?**	Response If unpaired before: **+BTSTATUS: <status>** If paired before but unconnected: **+BTSTATUS: <status>** **P: <paired id>, <name> <address>** If paired and connected: **+BTSTATUS: <status>** **P: <paired id>, <name> <address>** **C: <connected id>,<name>,<address>,<profile name>** **OK**
	Parameter **<status>** 0 Initial 1 disactivating 2 activating 5 idle 6 scanning 7 Inquiry_Res_Ind 8 stopping scanning 9 Bonding 12 Connecting 13 unpairing 14 deleting paired device 15 deleting all paired device 16 disconnecting 19 pairing confirm 20 waiting for remote confirm

	25 Accepting connection 26 SDC Refreshing 29 setting host name 30 Releasing all connection 31 Releasing connection 36 activating service **<paired id>** paired device ID **<connected id>** connected device ID <**name**> device name <**address**> device address **<profile name>** profile
Note	name length is max. 18 bytes in UTF-8 code

2.3. AT+BTPOWER Power On/off BT radio

AT+BTPOWER	
Test Command **AT+BTPOWER=?**	Response **+BTPOWER:** (list of supported **<n>**s) **OK**
Write Command **AT+BTPOWER=<n>**	Response **OK**
	parameter **<n>** 0 shut down BT radio 1 power on BT radio
Note	After shut down BT radio, should wait 25s at least to re-power BT radio.

2.4. AT+BTPAIR Pair BT device

AT+BTPAIR	
Test Command **AT+BTPAIR=?**	Response **+BTPAIR:** 0,(list of supported **<device ID>**s) **+BTPAIR:** 1,(list of supported **<confirm>**s) **+BTPAIR:** 2,(length of supported **<passkey>**s) **OK**
Write Command 1) active **AT+BTPAIR=0,<device ID>**	Response **OK** If digital key exchanged **+BTPAIRING: <name>,<address>,<passcode>**

2) passive **AT+BTPAIR=1,<confirm>** 3) passive with passkey request **AT+BTPAIR=2,<passkey>**	If passkey exchanged: **+BTPAIRING: <name>,<address>** If passive mode with succees: **+BTPAIR: <id>,<name>,<address>** If passive mode with failure: **+BTPAIR: 0**
	参数 **<device ID>** BT device ID **<confirm>** 1 accept 0 reject **<passkey>** passkey, length is（4-16） **<id>** 0 paired failed >=1paired deivce ID <**name**> BT device name <**address**> BT Device address **<passcode>** digital password
	URC If there is incoming request: **+BTPAIRING: <name>,<address>,<passcode>** or **+BTPAIRING: <name>,<address>** Parameter <**name**> device name <**address**> device address **<passcode>** digital password
注释	1. name length is max. 18 bytes in UTF-8 code 2. pairing timeout is around 15 each side

2.5. AT+BTUNPAIR Unpair BT device

AT+ BTUNPAIR	
Test Command **AT+BTUNPAIR=?**	Response **+BTUNPAIR: (**list of supported **<device ID>**s**)** **OK**
	Parameter See Write Command
Write Command **AT+BTUNPAIR=<device ID>**	Response **OK**
	Parameter

	<device ID> Paired Device ID. If 0, then will delete all paired device.

2.6. AT+BTSCAN Scan surrounding BT device

AT+ BTSCAN	
Test Command **AT+BTSCAN=?**	Response **+BTSCAN: (**list of supported **<switch>**s**), (**list of supported **<Timer>**s**)** **OK**
Wrtie Command **AT+BTSCAN=<switch>[,<Timer>]**	Response **OK** If BT device scanned: **+BTSCAN: <status>,<device ID>,<name>,<address>** If terminate: **+BTSCAN: <status>**
	Parameter **< switch >** 1 start 0 stop **<status>** 0 BT device found 1 scanning finished 2 scanning stop 3 scanning fialed **< Timer >** scanning time 10-60s **<device ID>** BT device ID scanned <**name**> BT device name <**address**> BT device address
Note	1. Name length is max. 18 bytes in UTF-8 2. If <timer> ommited, the default value is 30s

2.7. AT+BTCONNECT Connect paired BT device

AT+ BTCONNECT	
Test Command **AT+BTCONNECT=?**	Response **+BTCONNECT: (**list of supported **<device ID>**s**), (**list of supported **<profile ID>**s**)** **OK**
Write Command	Response

AT+BTCONNECT=<device ID>,<profile ID>	**OK** If OK: **+BTCONNECT: <id>,<name>,<address>,<profile name>** If failed: **+BTCONNECT: 0**
	Parameter **<device ID>** **< profile ID>** **<id>** <**name**> <**address**> **<profile name>**
Note	1. name length is max 18 bytes in UTF-8 code 2. connection timeout is around 20s 3. if incoming request, there will be URC **+BTCONNECING: <address>,<profile name>**

2.8. AT+BTDISCONN Disconnect BT connection

AT+ BTDISCONN	
Test Command **AT+BTDISCONN=?**	Response **+BTDISCONN: (**list of supported **<device ID>**s**)** **OK**
Write Command **AT+BTDISCONN=<device ID>**	Response **OK** **+BTDISCONN: <name>,<address>,<profile name>**
	Parameter **<device ID>** connected device ID <**name**> device name <**address**> devie address **<profile name>** profile service
Note	1. Name length is 18 bytes in UTF-8 code 2. If disconnected by remote, there still be URC: +BTDISCONN

2.9. AT+BTGETPROF Get profile provided by paired Device

AT+ BTGETPROF	
Test Command **AT+BTGETPROF=?**	Response **+BTGETPROF: (**list of supported **<device ID>**s**)**

	OK
	Parameter See Write Command
Write Command **AT+BTGETPROF=<device ID>**	Response **OK** **+BTGETPROF: <profile ID>,<name>**
	Parameter **<device ID>** Paired Device ID **<profile ID>** profile ID **<name>** Profile service

2.10. AT+BTACPT Accept connecting request

AT+ BTACPT	
Test Command **AT+BTACPT=?**	Response **+BTACPT:** (list of supported **<confirm>**s) **OK**
Write Command **AT+BTACPT=<confirm >**	Response **OK** If connected successfully, then will report: **+BTCONNECT: <id>,<name>,<address>,<profile name>** If connecting failed: **+ BTCONNECT: 0**
	Parameter **<confirm>** 1 accept 0 reject **<id>** >0 connected device ID <**name**> device name <**address**> device address **<profile name>** profile name
	URC If incoming request: **+BTCONNECTING: <address>, <profile name>** Parameter <**address**> device address **<profile name>** profile name

Note	1. name length is 18 bytes in UTF-8 code

2.11. AT+BTOPPACPT Accept OPP service

AT+ BTOPPACPT	
Test Command **AT+BTOPPACPT=?**	Response **+BTOPPACPT: (**list of supported **<confirm>**s**)** **OK**
Write Command **AT+BTOPPACPT=< confirm >**	Response **OK** **+BTOPPPUSH: <status>**
	Parameter **<confirm>** 1 Aacept 0 Reject **<status>** 0 successful 1 failed
	URC: If there has a incoming opp file, there will be a URC report. **+BTOPPPUSHING: <name>, <file name>** Parameter <**name**> device name **<file name>** file name
Note	1. <name> supports 18 bytes in max. and in UTF-8 code 2. File is stored in path: C:\Received\

2.12. AT+BTOPPPUSH Push OPP object to paired device

AT+ BTOPPPUSH	
Test Command **AT+BTOPPPUSH=?**	Response **+BTOPPPUSH: (**list of supported **<device ID>**s**), (**length of supported **<string>**s**)** **OK**
	Parameter See Write Command
Write Command **AT+BTOPPPUS**	Response **OK**

HT=<device ID>,<string>	**+BTOPPPUSH: <para>**
	Parameter **<device ID>** Paired Device ID **<string>** complete path for file, lenght（4-259） **<para>** 0 Send successfully 1 Send failed 2 Server issue

2.13. AT+BTSPPGET Get data from BT serial port as client based on SPP service

FILE

AT+ BTSPPGET	
Test Command **AT+BTSPPGET=?**	Response **+BTSPPGET: (**list of supported **<command>**s**)** **OK**
	Parameter See Write Command
Read Command **AT+BTSPPGET?**	Response **+BTSPPGET: <command>** **OK**
	Parameter See Write Command
Write Command **AT+BTSPPGET=<command>[,<reqLength>][,<showWithHex>]**	Response **+BTSPPDATA: <port ID>,<cnfLen>,<data string>** **OK** **or** **+BTSPPGET: <port ID>,<cnfLen>,<data string>** **OK** Autonous mode, the header will be +BTSPPDATA, manual mode, the header will be +BTSPPGET.
	Parameter **<command>** 0 Autonous mode. Data will be output in decimal system 1 manual mode. There will be an indication when first package arrived

	2 Inquiry data length under manual mode 3 Get data under manual mode **<reqLength>** 1-1024 , the length of data requested, only valid under manual mode <**showWithHex**> 1, displayed with HEX, only valid under manual mode **<port ID>** Serial port ID **<cnfLen>** 1-1024, the length to be printed **<data string>** string received
Reference	1. Under manual mode, the URC is +BTSPPGET: 1 for first incoming message 2. Print data under automatic mode

2.14. AT+BTSPPSEND Send data to BT serial port as client based on SPP service

AT+ BTSPPSEND	
Set Command **AT+BTSPPSEND =<length>**	Response **>** If successful, **SEND OK** Or if failed, **SEND FAIL**
	Parameter **<length>** 1-1024, the length of data will be sent. When the length of inputing data is up to <length> specified, the package will be sent out automatically. ESC key is used to quit in the middle of process.
Execute Command **AT+BTSPPSEND**	Response **>** If successful, **SEND OK** Or failed, **SEND FAIL**
	Under this mode, <Ctrl+z> will submit the package, ESC will quit the process.

2.15. AT+BTATA Answer incoming call

AT+ BTATA	
Execute Command	Response

AT+BTATA	**OK**
	Module is Earphone mode

2.16. AT+BTATDL Redial last number

AT+ BTATDL	
Execute Command **AT+BTATDL**	Response **OK**
	Module is Earphone mode

2.17. AT+BTATH Hung up voice call

AT+ BTATH	
Execute Command **AT+BTATH**	Response **OK**
	Module is Earphone mode

2.18. AT+BTVGS Configure Voice volume

AT+BTVGS	
Test Command **AT+BTVGS=?**	Response **+BTVGS: (<gain>** range**)** **OK**
	Module is Earphone mode
Read Commnad **AT+BTVGS?**	Response **+BTVGS: <gain>** **OK**
Write Command **AT+BTVGS=<gain>**	Response **OK**
	Parameter **<gain>** volume
Note	Module is Earphone mode

2.19. AT+BTVGM Configure MIC gain level

AT+BTVGM	
Test Command **AT+BTVGM=?**	Response **+BTVGM: (<gain>)** **OK**

Read Command **AT+BTVGM?**	Response **+BTVGM: <gain>** **OK**
Write Command **AT+BTVGM=<gain>**	Response **OK**
	Parameter <**gain**> MIC gain level Module as earphone connected to cellphone, this command could configure MIC gain level
Note	

2.20. AT+BTATD Dial voice call

AT+BTATD	
Test Command **AT+BTATD=?**	Response **+BTATD: (<number>)** **OK**
Write Command **AT+BTATD=<number>**	Response **OK**
	Parameter <**number**> phone number Module as earphone connected to cellphone, this command could make an outgoing call
Note	

2.21. AT+BTRSSI Get RSSI of connected BT device

AT+BTRSSI	
Test Command **AT+BTRSSI=?**	Response **+BTRSSI: (<device ID>)** **OK**
Write Command **AT+BTRSSI=<device ID>**	Response **+BTRSSI: <rssi>** **OK**

	Parameter **<device ID>** Connected Device ID **<rssi>** RSSI value
Note	RSSI value is negative, the small number stands for bad signal

3. CME Error Code

+CME ERROR: <err>

Code	Description
1000	Return fail
1002	Not power on
1003	State not idle
1004	Malloc error
1010	Scan fail
1011	scan return error
1020	Out of scanning count
1021	Out of profile id count
1025	Out of pairing count
1026	Bond error
1027	Device has Bonded
1030	Debond error
1031	Get device info error
1032	Service refresh error
1033	Profile connect error
1040	OPP handle error
1041	OPP send error
1045	OPP send error by server
1046	Get index by profile error
1047	Connect not support
1048	Disconnect not support
1049	Active or address error
1050	Only connect one device
1055	Spp is not connect
1099	BTAUD attach error

4 Examples

Following are some examples for BT application.

Here, black AT interface in left and blue response for clear understanding.

4.1 Accept request from other BT device

Command	Description
AT+BTPOWER=1 OK	Power on BT radio
+BTPAIRING: "PC-NS130100361",34:c7:31:aa:37:5b,763191	Incoming request from other BT device
AT+BTPAIR=1,1 OK +BTPAIR: 1, "PC-NS130100361",34:c7:31:aa:37:5b	Accept pairing request, and paired successfully

4.2 Send pairing request to other BT device

Command	Description
AT+BTPOWER=1 OK	Power on BT radio
AT+BTSCAN=1,20 OK +BTSCAN: 1,"PC-NS130100361",34:c7:31:aa:37:5b +BTSCAN: 2,"ADMIN-9A6E040AC",68:5d:43:ec:fe:72 +BTSCAN: 3,"LIB-PC",c8:f7:33:43:48:e6 +BTSCAN: 4,"MK-FUJIANJUN",88:53:2e:e8:9d:0f +BTSCAN: 5,"MTKBTDEVICE",45:8c:96:3e:66:01 +BTSCAN: 6,"MK-ZHANZHIMIN",00:1a:7d:da:71:10 +BTSCAN: 1	Inquiring surrounding BT device
AT+BTPAIR=0,6 OK	Try to pair the sixth BT device in the view list
+BTPAIRING: "MK-ZHANZHIMIN",00:1a:7d:da:71:10,76319	Responds the pairing

1 AT+BTPAIR=1,1 OK +BTPAIR: 1, "MK-ZHANZHIMIN",00:1a:7d:da:71:10	

4.3 Get the profile provided by paired device

Command	Description
	configure based on example 4.2
AT+BTGETPROF=1 +BTGETPROF: 1," Advanced Audio Distribution" +BTGETPROF: 2," Object Push" +BTGETPROF: 3," Serial Port" +BTGETPROF: 4,"Handsfree" +BTGETPROF: 5,"Headset" OK	Get the profile of first paired device in list

4.4 Connect service

Command	Description
	Get Profile based on example 4.3
AT+BTCONNECT=1,4 OK +BTCONNECT: 1,"MK-ZHANZHIMIN",00:1a:7d:da:71:10,"Handsfree"	Request the forth profile service "HF" of first paired device

4.5 Accept file from paired device

Command	Description
	Pairing device based on example 4.2
+BTOPPPUSHING: "MK-ZHANZHIMIN","link.txt"	incoming opp pushing service from paired device
AT+BTOPPACPT=1 OK	Accept file

4.6 Send file to other paired BT device

Command	Description
	Pairing device based on example 4.2
AT+BTOPPPUSH=1,c:\Received\link.txt OK +BTOPPPUSH: 1	Sending file and waiting for response

4.7 AT Channel mode, Module as client

SPP service has two kinds of connection. One is client mode via AT command channel (shorted as AT channel mode following), another is pear to pear mode to exchange data (shorted as exchanged mode following).
This section is for AT channel mode as client.

Command	Description
AT+BTSPPGET=0 OK AT+BTCONNECT=1,3 OK +BTCONNECT: 1," BTOTHER",12:34:56:78:90:12,"Serial Port " AT+BTSPPSEND >1234567890 SEND OK +BTSPPDATA: 19,10,1234567890	Based on example 4.3, get profile. Supposed local device ID is 34:c7:31:aa:37:5b, another remote device ID is 12:34:56:78:90:12, name is BTOTHER, unconnected. set report-auto mode Connect server Report automatically once ok Send data here when get propomt “>” Report the data sent out

4.8 AT Channel mode, module as server

Command	Description
AT+BTSPPSEND=10	Supposed module acts as serve, connection is available, but first data package is not “SIMCOMSPPFORAPP” At this moment, data can not be sent

ERROR	

4.9 Exchanged mode setup

Command	Description
	Based on example 4.3
AT+BTSPPGET=0 OK	Set auto-report mode\
AT+BTCONNECT=1,3 OK	Connect remote pear
+BTCONNECT: 1,"BTOTHER",12:34:56:78:90:12,"Serial Port "	Report automatically once ready
AT+BTSPPGET? +BTSPPGET: 0 OK	Get SPP report mode
AT+BTSPPSEND > SIMCOMSPPFORAPP +BTSPPDATA: 19,10,1234567890 AT OK	
AT+BTSPPGET=1 ERROR	After connected, get mode can not be configured
AT+BTSPPGET=1 OK	Supposed manual mode ok
AT+BTCONNECT=1,3 OK	connect
+BTCONNECT: 1,"BTOTHER",12:34:56:78:90:12,"Serial Port " AT+BTSPPSEND > SIMCOMSPPFORAPP +BTSPPMAN: 19 AT	

OK AT+BTSPPGET=2 +BTSPPGET: 19,10 OK AT+BTSPPGET=3,3 +BTSPPGET:19,3,123 OK AT+BTSPPGET=3,10,1 +BTSPPGET: 19,7,34353637383930 OK +BTSPPMAN: 19	Inquiry data length Read 3 bytes Read 10 bytes and display in hex
AT+BTSPPGET=? +BTSPPGET: (0-3) OK	

4.10 Data Exchanged

Command	Descrition
AT+BTSPPSEND=10 >1234567890 SEND OK	
AT+BTSPPSEND >abcdefg SEND OK	。

4.11 Module as SPP server

Command	Description
	Based on example 4.2
+BTCONNECTING: 00:1a:7d:da:71:10," Serial Port"	Request from remote
AT+BTACPT=1 OK +BTCONNECT: 1,	Accept request

"MK-ZHANZHIMIN",00:1a:7d:da:71:10," Serial Port"	

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Appendix

A. Reference

ID	Document	Remark
[1]	SIM800 Series AT Command Manual	

B. Glossary and Abbreviation

术语	描述
EVB	Evaluation Board
BT	Blue tooth
PROFILE	Bluetooth function protocol
SPP	Serial Port Profile
OPP	OPP Object Push Profile
A2DP	Advanced Audio Distribution Profile
AVRCP	Audio Video Remote Control Profile
HSP	BT handset protocol
HFP	HandFree application protocol
URC	Unsolicited Result Code
TE	Terminal Equipment
TA	Terminal Adapter
DTE	Data Terminal Equipment
DCE	Data Communication Equipment
ME	Mobile Equipment
MS	Mobile station

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