HHW-SPP Bluetooth Module

AT Commands

The HHW-SPP Bluetooth module has 2 work modes: Commands response mode and auto connection mode. And in the auto connection mode, there are Master and Slave mode. When the module works in the auto connection mode, it will automatically connect the other Bluetooth devices with SPP protocols. When under the Commands response mode, it can carry out the AT commands in this data sheet, user can send all the AT commands to the module to configure it. By controlling the PIO11 of the module, use can set the working mode of the module.

The Pins that module will use:

1. PIO8, connect to LED shows the working status of the Bluetooth module. After power up, it will flash, and the flash time is different under different status.
2. PIO9 connect to LED shows the success of the connection, after successfully pairing, it will light.
3. PIO11, control the module working mode, High=AT commands receiving mode(Commands response mode), Low or NC= Bluetooth module normally working.

Set the module working under Master mode:

1. PIO11 set High
2. Power up the module and using the AT commands receiving mode
3. Use the Hyper Terminal software or other RS232 communication tools, set the baud rate at 38400, Data bit:8, Stop bit:1, No Parity and Flow control.
4. Send the “AT+ROLE=1\r\n”, if success, it will return with “OK\r\n”, the “\r\n” is “Enter”
5. PIO11 set to low, and re-power up, now the module is working as Master, and automatically search the slave modules, and setup the connection.

Command详细说明

（AT Commands instruction(“\r\n” means “Enter”)

1. Test：

Command	Response	Parameter
AT	OK	None

2. Reboot：

Command	Response	Parameter
AT+RESET	OK	None

4. Get the version of module：

Command	Response	Parameter
AT+VERSION?	+VERSION:< Param > OK	Param：Version

Example：

at+version?\r\n

+VERSION:1.0-20090818

OK

4. Restore to default:

Command	Response	Parameter
AT+ORGL	OK	None

Default：

①Equipment ID： 0

②Search code:0x009e8b33

③. Working role：Slave Mode

④. Connection mode：Specific Bluetooth module

⑤. RS232 configuration：Baud Rate—38400bits/s or 9600bits/s; Stop Bit：1；Parity：None None

⑥. Pair code：“1234”

⑦. Device name："HHW-SPP-1800-2"

5. Get module Bluetooth address：：

Command	Response	Parameter
AT+ADDR?	+ADDR: <Param > OK	Param：Module address

Bluetooth module address type：NAP: UAP : LAP（HEX）

Example：

Bluetooth module address： 12：34：56：ab:cd:ef

at+addr?\r\n

+ADDR:1234:56:abcdef

OK

6. Set/Search device name：

Command	Response	Parameter
AT+NAME= < Param >	OK	Param：Bluetooth device name Default name：“HHW-SPP-1800-2”
AT+NAME?	1、+NAME:< Param > OK 2、FAIL	

Example：

AT+NAME=HHW-SPP-1800-2\r\n ————Set device name for：“HHW-SPP-1800-2”
OK
AT + NAME=“HHW-SPP-1800-2”\r\n ————Set device name for：“HHW-SPP-1800-2”
OK
at + name = Beijin\r\n ————Set device name for：“Beijin”
OK
at + name =“Beijin”\r\n ————Set device name for：“Beijin”
OK
at+name?\r\n
+NAME: Beijin
OK

7. Get the remote Bluetooth device name：

Command	Response	Parameter
AT+RNAME? <Param1 >	1、+RNAME: <Param2 > OK 2、FAIL	Param1：Remote device address Param2：Remote device name

蓝牙地址表示方法：NAP: UAP : LAP（十六进制）

Example：

The remote Bluetooth address is：00:02:72:0d:22:24，name：Bluetooth

at+rname? 0002,72,0d2224\r\n

+RNAME:Bluetooth

OK

8. Set/enquire module role：

Command	Response	Parameter
AT+ROLE=< Param >	OK	Param：Parameter取值如下: 0 ——Slave 1 ——Master 2 —— Slave-Loop Default：0
AT+ROLE?	+ROLE: < Param > OK	

Slave———Passive connection；
Slave-Loop ———Get the Bluetooth data and send them back to the sender
；

9. Set/enquire -devices：

Command	Response	Parameter
AT+CLASS=< Param >	OK	Param：Device
AT+CLASS?	1、+CLASS: < Param > OK ——成功 2、FAIL ——失败	Default:0

To filter other Bluetooth devices, and get fast enquire for the specific Bluetooth devices, use can set the module as the no-standard bluetooth module, like: 0x1f1f

10. Set/enquire –Search access code：

Command	Response	Parameter
AT+IAC=< Param >	1、 OK 2、 FAIL	Param： Search Access code default：9e8b33
AT+IAC?	+ IAC: < Param > OK	

Search access code is the GIAC(General Inquire Access Code ：0x9e8b33) general access cide，it used for discover the other devices in the area. User can set it to own code for fast enquire，such as the code beyond the GIAC or LIAC，like：9e8b3f

Example：

AT+IAC=9e8b3f\r\n
OK
AT+IAC? \r\n
+ IAC：9e8b3f
OK

11. Set/enquire –search mode:

Command	Response	Parameter
AT+ INQM= < Param1 >，< Param2 >，< Param3 >	1、 OK 2、 FAIL	Param1：search mode 0 —— inquiry_mode_standard 1 —— inquiry_mode_rssi Param2：Max response Unit Param3：Max over-time over-time： 1 ～ 48 (for real time：1.28 秒 ～ 61.44 秒) Default：1,1,48
AT+ INQM?	+ INQM: < Param1 >，< Param2 >，< Param3> OK	
Example：		

AT+INQM=1,9,48\r\n ——set to the search mode：with RSSI signal strength， stop the inquire when found >9 devices，max time is 48x1.28=61.44 S.

OK

AT+INQM?\r\n
+INQM:1,9,48
OK

12. Set/enquire –Pairing code:

Command	Response	Parameter
AT+PSWD=< Param >	OK	Param： Pairing code Default： “1234”
AT+PSWD?	+ PSWD: < Param > OK	

13. Set/inquire –UART setup:

Command	Response	Parameter
AT+ UART=< Param1 >，< Param2 >，< Param3 >	OK	Param1： Baud rate(bits/s) List（DEC）： 4800 9600 19200 38400 57600 115200 230400 460800 921600 1382400 Param2： Stop Bit 0 —— 1 1 —— 2 Param3：Parity 0 —— None 1 —— Odd 2 —— Even Default：9600,0,0
AT+ UART?	+ UART :< Param1 >，< Param2 >，< Param3> OK	

Example：set the baud rate to 115200, 2 bit stop, Even Parity

AT+ UART=115200,1,2\r\n
OK
AT+ UART?
+UART:115200,1,2
OK

14. Set/inquire –Connection mode:

Command	Response	Parameter
AT+CMODE=< Param >	OK	Param： 0 ——Set the Bluetooth address connection mode 1 ——Random Bluetooth address Default：0
AT+CMODE?	+CMODE: < Param > OK	

15. Set/Inquire—Band Bluetooth address

Command	Response	Parameter
AT+BIND=< Param >	OK	Param —— Band device address Default address： 00:00:00:00:00:00
AT+BIND?	+BIND:< Param> OK	

This command only works under the Set the Bluetooth address connection mode

Example：
If use want to set the device address to:12:34:56:ab:cd:ef
The commands should be：

AT+BIND=1234,56,abcdef\r\n
OK
AT+BIND?\r\n
+BIND:1234:56:abcdef
OK

16. Set/Inquire--LED display and polarity:

Command	Response	Parameter
AT+POLAR=< Param 1>，< Param2>	OK	Param1： 0 —— PIO8 =Low will light the LED 1 —— PIO8=High will light the LED Param2： 0 —— Success when PIO9=low 1 ——Success when PIO9=High Default：1，1
AT+POLAR?	+ POLAR : < Param 1>，< Param2> OK	

Example：
LED light when PIO8 output low，PIO9 output high when connection is successful

AT+POLAR=0,1\r\n
OK
AT+ POLAR?\r\n
+ POLAR:0,1
OK

17. Set the PIO single port output:

Command	Response	Parameter
AT+PIO=<Param1 >，<Param2 >	OK	Param1：PIO number（DEC） Param2：PIO output status 0 —— Low 1 —— High

Example：

1、PIO10 Output High

AT+PIO=10,1\r\n

OK

2、PIO10 Output Low

AT+PIO=10,0\r\n

OK

18. Set PIO multi-port output:

Command	Response	Parameter
AT+MPIO=<Param >	OK	Param： PIO Number Combine（HEX）

PIO Number = (1 << PIO Number)

PIO Number Combine= (PIO Number 1 | PIO Number 2 | ……)

Example：

PIO2 Number =（1<<2） =0x004

PIO10 Number =（1<<10）=0x400

PIO2 and PIO10 Number combine= (0x004 | 0x400) =0x404

Example：

1、 PIO10 and PIO2 output high

AT+MPIO=404\r\n

OK

2、PIO4 output high

AT+PIO=004\r\n

OK

4、PIO10 output high

AT+PIO=400\r\n

OK

5、All port output Low

AT+MPIO=0\r\n

OK

19. Check PIO Input:

Command	Response	Parameter
AT+MPIO?	+MPIO: <Param > OK	Param——PIO Number（16bits） Param[0] = PIO0 Param[1] = PIO1 Param[2] = PIO2 …… Param[10] = PIO10 Param[11] = PIO11

20. Set/access scan time Parameter:

Command	Response	Parameter
AT+IPSCAN=< Param 1>，< Param2>，< Param3>，< Param4>	OK	Param1：Check time Param2：Check Continue time

21. Set/Inquire--SNIFF Power Saving Parameter:

Command	Response	Parameter
AT+SNIFF=< Param 1>，< Param2>，< Param3>，< Param4>	OK	Param1：Max time Param2：Min Time Param3：Try time Param4：Over time All DEC Default： 0,0,0,0
AT+SNIFF?	+SNIFF:< Param 1>，< Param2>，< Param3>，< Param4> OK	

22. Set/Inquire Security and encrypt:

Command	Response	Parameter
AT+SENM=< Param 1>，< Param2>	1、 OK 2、 FAIL	Param1：Safety mode： 0 ——sec_mode0_off 1 ——sec_mode1_non_secure 2 ——sec_mode2_service 3 ——sec_mode3_link 4 ——sec_mode_unknown Param2：Encrypt Mode： 0 ——hci_enc_mode_off 1 ——hci_enc_mode_pt_to_pt 2 ——hci_enc_mode_pt_to_pt_and_bcast Default：0，0
AT+SENM?	+SENM:< Param 1>，< Param2> OK	

23. Delete Authenticated Device in the pairing list：

Command	Response	Parameter
AT+RMSAD=<Param >	OK	Param： Device address

Example：

Delete the device which address is ： 12:34:56:ab:cd:ef

at+rmsad=1234,56,abcdef\r\n

OK

or

at+rmsad=1234,56,abcdef\r\n

FAIL ——The device didn’t exist

24. Delete all Authenticated Device in the pairing list：

Command	Response	Parameter
AT+RMAAD	OK	None

Example：

at+rmaad\r\n
OK

25. Search specific Authenticated Device in the pairing list：

Command	Response	Parameter
AT+FSAD=<Param >	1、 OK ——Exist 2、 FAIL ——No exist	Param： Device address

Example：

Search the device in the list：12:34:56:ab:cd:ef

at+fsad=1234,56,abcdef\r\n
OK —— It exist。

at+fsad=1234,56,abcde0\r\n
FAIL —— It didn't exist。

26. Inquire the Authenticated Device count in the pairing list：

Command	Response	Parameter
AT+ADCN?	+ADCN: <Param > OK	Param：Device count

Example：

at+adcn?
+ADCN:0
OK

27. Inquire Most Recently Used Authenticated Device：

Command	Response	Parameter
AT+MRAD?	+MRAD: <Param > OK	Param：The recent devices used

Example：

at+mrad?
+MRAD:0:0:0 —— No recent used devices
OK

28. Inquire the Bluetooth module status：

Command	Response	Parameter
AT+STATE?	+STATE: <Param > OK	Param：Working Status Feedbacks： "INITIALIZED" ——Initial "READY" ——prepared "PAIRABLE" ——Can be paired "PAIRED" ——Paired "INQUIRING" ——Enquire "CONNECTING" ——Connection "CONNECTED" ——Connected "DISCONNECTED" ——Disconnected "NUKNOW" ——Unkown

Example：

at+state?
+STATE:INITIALIZED —— Initial
OK

29. Initialize SPP Base（Initialise the spp profile lib）：

Command	Response	Parameter

AT+INIT	1、 OK 2、 FAIL	None

30. Inquire Bluetooth devices:

Command	Response	Para
AT+INQ	+INQ: <Param1 >,<Param2 >, <Param3 > …… OK	Param1：Address Param2：Type Param3：RSSI Signal Strength

Example 1：

at+init\r\n —— Initial SPP（can't repeat）
OK
at+iac=9e8b33\r\n —— Search the device which can be access
OK
at+class=0\r\n —— Search all the devices
OK
at+inqm=1,9,48\r\n —— Inquire mode：with RSSI，Max devices=9，over-time is 48x1.28=61.44 S。
At+inq\r\n —— Search Bluetooth devies
+INQ:2:72:D2224,3E0104,FFBC
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC0
+INQ:1234:56:0,1F1F,FFC1
+INQ:2:72:D2224,3E0104,FFAD
+INQ:1234:56:0,1F1F,FFBE
+INQ:1234:56:0,1F1F,FFC2
+INQ:1234:56:0,1F1F,FFBE
+INQ:2:72:D2224,3E0104,FFBC
OK

Example 2：

at+iac=9e8b33\r\n ——Search the device which can be access
OK
at+class=1f1f\r\n —— Search the type 0x1f1f device
OK
at+inqm=1,9,48\r\n ——Inquire mode：with RSSI，Max devices=9，over-time is 48x1.28=61.44 S。
At+inq\r\n —— Filter devices
+INQ:1234:56:0,1F1F,FFC2
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC2
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC1
+INQ:1234:56:0,1F1F,FFC0
+INQ:1234:56:0,1F1F,FFC2
OK

Example 3：

at+iac=9e8b3f\r\n —— Search the access code is 0x9e8b3f device
OK
at+class=1f1f\r\n ——Search the type 0x1f1f device
OK
at+inqm=1,1,20\r\n ——Inquire mode：with RSSI，Max devices=9，over-time is 48x1.28=61.44 S。
At+inq\r\n ——Filter devices
+INQ:1234:56:ABCDEF,1F1F,FFC2
OK

31. cancel the search：

Command	Response	Parameter
AT+INQC	OK	None

32. Pairing：

Command	Response	Parameter
AT+PAIR=<Param1 >,<Param2 >	1、OK 2、FAIL	Param1：Device address Param2：Over-time:S

Example：

Pair with remote devie：12:34:56:ab:cd:ef，Max Over time is 20 S。

At+pair=1234,56,abcdef,20\r\n

OK

33. Device connect：

Command	Response	Parameter
AT+LINK=<Param >	1、 OK 2、 FAIL	Param：Device address

Example：

Connect with remote device：12:34:56:ab:cd:ef

at+fsad=1234,56,abcdef\r\n —— Search 12:34:56:ab:cd:ef whether in the pair list

OK

at+link=1234,56,abcdef\r\n ——12:34:56:ab:cd:ef is in the list，can connect directly

OK

34. Disconnect

Command	Response	Parameter
AT+DISC	1、 +DISC:SUCCESS OK 2、 +DISC:LINK_LOSS OK 3、 +DISC:NO_SLC OK 4、 +DISC:TIMEOUT OK 5、 +DISC:ERROR OK	None

35. Enter Power saving mode：

Command	Response	Para
AT+ENSNIFF=<Param>	OK	Param：Device address

36. Quit Power Saving mode

Command	Response	Parameter
AT+EXSNIFF=<Param>	OK	Param：Device address

Appendix 1: AT Command Error Codes

Error Codes return in the form of ERROR—— ERROR:(error_code)

error_code (HEX)	DETAIL
0	AT command error
1	Command result is
2	default value
	SKEY write error
3	Device name is too long (more than 32 bytes)
4	Device name length is zero
5	Bluetooth address: NAP is too long
6	Bluetooth address: UAP is too long
7	Bluetooth address: LAP is too long
8	PIO Serial Number mask length is zero
9	Invalid PIO serial number
A	Device type length is zero
B	Device type is too long
C	Inquiry access code length is zero
D	Inquiry access code digit is too long
E	Invalid inquiry access code
F	Matching code length is zero
10	Matching code is too long (more than 16 bytes)
11	Invalid module role
12	Invalid baud rate
13	Invalid stop bit
14	Invalid parity bit
15	Certified device does not exist in the matching list
16	SPP database is not initialized
17	SPP database is initialized repeatedly
18	Invalid inquiry mode
19	Inquiry timeout too long
1A	Bluetooth address is zero
1B	Invalid security mode
1C	Invalid encryption mode

Appendix 2：Device Type :

The Class of Device/Service(CoD)is a 32 bits number that is made of 3 fields. One field specifies the service supported by the device. Another field specifies the major device class, which broadly corresponds to the type of the device. The third field specifies the minor device class, which describes the device type in more detail

The Class of Device/Service (CoD) field has a variable format. The format is indicated using the 'Format Type field' within the CoD. The length of the Format Type field is variable and ends with two bits different from '11'. The version field starts at the least significant bit of the CoD and may extend upwards. In the 'format #1' of the CoD (Format Type field = 00), 11 bits are assigned as a bit-mask (multiple bits can be set) each bit corresponding to a high level generic category of service class. Currently 7 categories are defined. These are primarily of a 'public service' nature. The remaining 11 bits are used to indicate device type category and other device-specific characteristics.Any reserved but otherwise unassigned bits, such as in the Major Service Class field, should be set to 0.

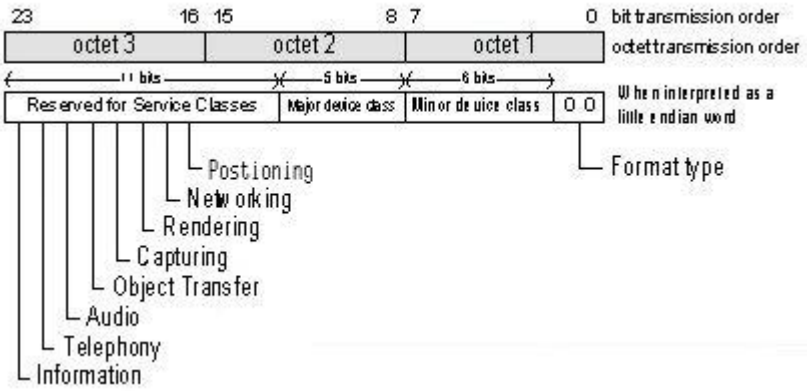

Figure 1.2: The Class of Device/Service field (first format type). Please note the order in which the octets are sent on the air and stored in memory. Bit number 0 is sent first on the air.

1. MAJOR SERVICE CLASSES

Bit no	Major Service Class
13	Limited Discoverable Mode [Ref #1]
14	(reserved)
15	(reserved)
16	Positioning (Location identification)
17	Networking (LAN, Ad hoc, ...)
18	Rendering (Printing, Speaker, ...)
19	Capturing (Scanner, Microphone, ...)
20	Object Transfer (v-Inbox, v-Folder, ...)
21	Audio (Speaker, Microphone, Headset service, ...)

22	Telephony (Cordless telephony, Modem, Headset service, ...)
23	Information (WEB-server, WAP-server, ...)

TABLE 1.2: MAJOR SERVICE CLASSES

[Ref #1 As defined in See Generic Access Profile, Bluetooth SIG]

2. MAJOR DEVICE CLASSES

The Major Class segment is the highest level of granularity for defining a Bluetooth Device. The main function of a device is used to determine the major class grouping. There are 32 different possible major classes. The assignment of this Major Class field is defined in

Table 1.3.

12 11 10 9 8	Major Device Class
0 0 0 0 0	Miscellaneous [Ref #2]
0 0 0 0 1	Computer (desktop,notebook, PDA, organizers, ...)
0 0 0 1 0	Phone (cellular, cordless, payphone, modem, ...)
0 0 0 1 1	LAN /Network Access point
0 0 1 0 0	Audio/Video (headset,speaker,stereo, video display, vcr.....
0 0 1 0 1	Peripheral (mouse, joystick, keyboards, ...)
0 0 1 1 0	Imaging (printing, scanner, camera, display, ...)
1 1 1 1 1	Uncategorized, specific device code not specified
X X X X X	All other values reserved

TABLE 1.3: MAJOR DEVICE CLASSES

[Ref #2: Used where a more specific Major Device Class code is not suited (but only as specified in this document). Devices that do not have a major class code assigned can use the all-1 code until 'classified']

3. THE MINOR DEVICE CLASS FIELD

The 'Minor Device Class field' (bits 7 to 2 in the CoD), are to be interpreted only in the context of the Major Device Class (but independent of the Service Class field). Thus the meaning of the bits may change, depending on the value of the 'Major Device Class field'. When the Minor Device Class field indicates a device class, then the primary device class should be reported, e.g. a cellular phone that can also work as a cordless handset should use 'Cellular' in the minor device class field.

4. MINOR DEVICE CLASS FIELD - COMPUTER MAJOR CLASS

7 6 5 4 3 2	Minor Device Class bit no of CoD
0 0 0 0 0 0	Uncategorized, code for device not assigned

0 0 0 0 0 1 Desktop workstation
0 0 0 0 1 0 Server-class computer
0 0 0 0 1 1 Laptop
0 0 0 1 0 0 Handheld PC/PDA (clam shell)
0 0 0 1 0 1 Palm sized PC/PDA
0 0 0 1 1 0 Wearable computer (Watch sized)
X X X X X X All other values reserved

TABLE 1.4: SUB DEVICE CLASS FIELD FOR THE 'COMPUTER' MAJOR CLASS

5. MINOR DEVICE CLASS FIELD - PHONE MAJOR CLASS

Minor Device Class 7 6 5 4 3 2 bit no of CoD
0 0 0 0 0 0 Uncategorized, code for device not assigned
0 0 0 0 0 1 Cellular
0 0 0 0 1 0 Cordless
0 0 0 0 1 1 Smart phone
0 0 0 1 0 0 Wired modem or voice gateway
0 0 0 1 0 1 Common ISDN Access
0 0 0 1 1 0 Sim Card Reader
X X X X X X All other values reserved

TABLE 1.5: SUB DEVICE CLASSES FOR THE 'PHONE' MAJOR CLASS

6. MINOR DEVICE CLASS FIELD - LAN/NETWORK ACCESS POINT MAJOR CLASS

Minor Device Class 7 6 5 bit no of CoD
0 0 0 Fully available
0 0 1 1 - 17% utilized
0 1 0 17 - 33% utilized
0 1 1 33 - 50% utilized
1 0 0 50 - 67% utilized
1 0 1 67 - 83% utilized
1 1 0 83 - 99% utilized

1 1 1	No service available [REF #3]
X X X	All other values reserved

TABLE 1.6: THE LAN/NETWORK ACCESS POINT LOAD FACTOR FIELD

[Ref #3: "Device is fully utilized and cannot accept additional connections at this time, please retry later"]

The exact loading formula is not standardized. It is up to each LAN/Network Access Point implementation to determine what internal conditions to report as a utilization percentage.
The only requirement is that the number reflects an ever-increasing utilization of communication resources within the box. As a recommendation, a client that locates multiple LAN/Network Access Points should attempt to connect to the one reporting the lowest load.

4 3 2 bit no of CoD	Minor Device Class
0 0 0	Uncategorized (use this value if no other apply)
X X X	All other values reserved

TABLE 1.7: RESERVED SUB-FIELD FOR THE LAN/NETWORK ACCESS POINT

7. MINOR DEVICE CLASS FIELD - AUDIO/VIDEO MAJOR CLASS

7 6 5 4 3 2 bit no of CoD	Minor Device Class
0 0 0 0 0 0	Uncategorized, code not assigned
0 0 0 0 0 1	Device conforms to the Headset profile
0 0 0 0 1 0	Hands-free
0 0 0 0 1 1	(Reserved)
0 0 0 1 0 0	Microphone
0 0 0 1 0 1	Loudspeaker
0 0 0 1 1 0	Headphones
0 0 0 1 1 1	Portable Audio
0 0 1 0 0 0	Car audio
0 0 1 0 0 1	Set-top box
0 0 1 0 1 0	HiFi Audio Device
0 0 1 0 1 1	VCR
0 0 1 1 0 0	Video Camera
0 0 1 1 0 1	Camcorder
0 0 1 1 1 0	Video Monitor

0 0 1 1 1 1 Video Display and Loudspeaker

0 1 0 0 0 0 Video Conferencing

0 1 0 0 0 1 (Reserved)

0 1 0 0 1 0 Gaming/Toy [Ref #4]

X X X X X X All other values reserved

[Ref #4: Only to be used with a Gaming/Toy device that makes audio/video capabilities available via Bluetooth]

TABLE 1.8: SUB DEVICE CLASSES FOR THE 'AUDIO/VIDEO' MAJOR CLASS

8. MINOR DEVICE CLASS FIELD - PERIPHERAL MAJOR CLASS

Minor Device Class
7 6 bit no of CoD

0 1 Keyboard

1 0 Pointing device

1 1 Combo keyboard/pointing device

X X All other values reserved

TABLE 1.9: THE PERIPHERAL MAJOR CLASS KEYBOARD/POINTING DEVICE FIELD

Bits 6 and 7 independantly specify mouse,keyboard or combo mouse/keyboard devices. These may be combined with the lower bits in a multifunctional device.

Minor Device Class
5 4 3 2 bit no of CoD

0 0 0 0 Uncategorized device

0 0 0 1 Joystick

0 0 1 0 Gamepad

0 0 1 1 Remote control

0 1 0 0 Sensing device

0 1 0 1 Digitizer tablet

X X X X All other values reserved

TABLE 1.10: RESERVED SUB-FIELD FOR THE DEVICE TYPE

9. MINOR DEVICE CLASS FIELD - IMAGING MAJOR CLASS

Minor Device Class
7 6 5 4 bit no of CoD

X X X 1 Display

X X 1 X	Camera
X 1 X X	Scanner
1 X X X	Printer
X X X X	All other values reserved

TABLE 1.11: THE IMAGING MAJOR CLASS BITS 4 TO 7

Bits 4 to 7 independantly specify display, camera, scanner or printer. These may be combined in a multifunctional device.

Minor Device Class	
3 2	bit no of CoD
0 0	Uncategorized, default
X X	All other values reserved

TABLE 1.12: THE IMAGING MAJOR CLASS BITS 2 AND 3

Bits 2 and 3 are reserved

Appendix 3：The Inquiry Access Codes

The General- and Device-Specific Inquiry Access Codes (DIACs)

The Inquiry Access Code is the first level of filtering when finding Bluetooth devices and services. The main purpose of defining multiple IACs is to limit the number of responses that are received when scanning devices within range.

0. 0x9E8B33 —— General/Unlimited Inquiry Access Code (GIAC)
1. 0x9E8B00 —— Limited Dedicated Inquiry Access Code (LIAC)
2. 0x9E8B01 ～ 0x9E8B32 RESERVED FOR FUTURE USE
3. 0x9E8B34 ～ 0x9E8B3F RESERVED FOR FUTURE USE

The Limited Inquiry Access Code (LIAC) is only intended to be used for limited time periods in scenarios where both sides have been explicitly caused to enter this state, usually by user action. For further explanation of the use of the LIAC, please refer to the Generic Access Profile.

In contrast it is allowed to be continuously scanning for the General Inquiry Access Code (GIAC) and respond whenever inquired。