

i2616e-s+i2616e-u2+i2616e-u6+i2616e

Programming Manual

Dec 14 2023

V1.1

Version History

Version	Amendment	Date	Author
1.0	Initial version	2023-07-01	Xiaobo Li
1.1	Add/modify directives & events	2023-12-14	Xiaobo Li

Barrot Confidential

Contents

1. Introduction.....	8
1.1. Default Setting.....	8
2. FCC.....	9
3. Temperature Limit Characteristics.....	10
4. Commands Format	10
4.1. Definition	10
4.2. Format	11
4.2.1. AT Commands.....	11
5. Commands & Indications.....	12
5.1. AT Commands.....	12
5.1.1. Query Firmware Version.....	12
5.1.2. Query Configuration Information Version	13
5.1.3. Querying the silent mode.....	13
5.1.4. Set the silent mode	13
5.1.5. Querying the Device name	13
5.1.6. Set the device name	14
5.1.7. Querying unlocked Information	14
5.1.8. Setting a non-inductive unlock.....	14
5.1.9. Querying the local Bluetooth address	15
5.1.10. Setting the local Bluetooth address.....	15
5.1.11. Querying the baud rate of the serial port.....	15
5.1.12. Set the baud rate of the serial port.....	15

5.1.13.	Querying the flow control of the serial port.....	16
5.1.14.	Setting the flow control of the serial port.....	16
5.1.15.	Querying the Bluetooth mode.....	16
5.1.16.	Setting the Bluetooth mode	17
5.1.17.	Querying delay parameters.....	17
5.1.18.	Setting delay parameters	17
5.1.19.	Querying the wake up mode.....	18
5.1.20.	Setting the wake up mode.....	18
5.1.21.	Querying the broadcast ADV status	19
5.1.22.	Setting the broadcast ADV status	19
5.1.23.	Querying the broadcast interval.....	19
5.1.24.	Setting the broadcast interval	19
5.1.25.	Querying Broadcast Data	19
5.1.26.	Setting Broadcast Data	20
5.1.27.	Querying scan response data.....	20
5.1.28.	Setting scan response data.....	21
5.1.29.	Query connection parameters.....	21
5.1.30.	Setting connection parameters	21
5.1.31.	Querying scan parameters.....	22
5.1.32.	Set scan parameters	22
5.1.33.	Searching for BLE devices	23
5.1.34.	Querying the GATT MTU	23
5.1.35.	Set the GATT MTU.....	23

5.1.36.	Set the GATT Client UUID	23
5.1.37.	Set the UUID sent by the GATT Client.....	24
5.1.38.	Set the GATT Client to receive UUID	24
5.1.39.	Set the GATT Client flow control UUID	25
5.1.40.	Setting the GATT Server UUID	25
5.1.41.	Set the UUID received by the GATT Server	25
5.1.42.	Set the UUID sent by the GATT Server	26
5.1.43.	Setting the GATT Server Flow control UUID.....	26
5.1.44.	Querying the GATT Client/Server UUID.....	26
5.1.45.	Querying the authentication function.....	27
5.1.46.	Setting the authentication function.....	27
5.1.47.	Querying the transmit power.....	27
5.1.48.	Setting the transmit power.....	27
5.1.49.	Querying TRIM	28
5.1.50.	Setting TRIM	28
5.1.51.	Fixed frequency transmission	28
5.1.52.	Querying whitelist devices.....	29
5.1.53.	Adding whitelisted devices.....	29
5.1.54.	Deleting whitelisted devices.....	29
5.1.55.	Restore factory Settings	30
5.1.56.	RESET.....	30
5.1.57.	Connect.....	30
5.1.58.	Disconnect.....	30

5.1.59.	Querying the real-time MTU of the device.....	31
5.1.60.	Querying Connected devices	31
5.1.61.	Querying the pairing confirmation function	31
5.1.62.	Setting the pairing confirmation function	31
5.1.63.	Querying pairing Input and output capabilities	32
5.1.64.	Setting the input/output pairing capability.....	32
5.1.65.	Querying the pairing code	33
5.1.66.	Setting the pairing code	33
5.1.67.	Pairing Confirmation	33
5.1.68.	Enter the pairing code.....	33
5.1.69.	Querying multiple connection support.....	34
5.1.70.	Setting Multiple connection support.....	34
5.1.71.	Querying the PDU mode.....	35
5.1.72.	Setting the PDU mode.....	35
5.1.73.	Sending data in PDU mode.....	35
5.1.74.	The PDU mode is disconnected	36
5.2.	AT indication.....	36
5.2.1.	Ready status indication	36
5.2.2.	Connection status indication	36
5.2.3.	Disconnect instructions.....	36
5.2.4.	Connection Timeout indication.....	37
5.2.5.	Service mismatch indicator.....	37
5.2.6.	Pairing request instructions.....	37

5.2.7.	Pairing code indication.....	37
5.2.8.	Pairing code request instructions.....	37
5.2.9.	Pairing completion instructions.....	38
6.	Company Profile.....	38
7.	Contact Information	38
7.1.	Beijing.....	38
7.2.	Shenzhen	39
7.3.	Shanghai	39
8.	Copyright.....	39

Barrot Confidential

1.Introduction

The i2616e module is a Bluetooth 5.1 single-mode module whose firmware supports GATT Server standard applications.

This document describes the default Settings of the module and the instruction set. For details about functions and applications, see BARROT _i2616e_ Application Notes.

This document applies only to the i2616e module.

- Some configuration commands take effect after the system is restarted. For details, see Remarks.
- Pull up PB3, the module can automatically enter the sleep mode (the module will not receive data through uart), pull down PB3, the module will not enter the sleep mode.

1.1. Default Setting

- Default pairing PIN code: 123456
- Module default device name: i2616e
- i2616e UART default setting: Baud rate 115200, 8 data bits, 1 stop bit, no parity, hardware flow control enabled.
- RF band: 2400-2483.5MHz
- RF power: 6db

2. FCC

FCC ID: 2AOXV-I2616E-S

This equipment may be operated in all European countries.

Labeling requirements. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modification warning. Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End user must follow the specific operating instructions for satisfying RF exposure greater than or equal to 20cm compliance. This transmitter must not be colocated or operating in conjunction with any other antenna or transmitter.

The portable device is designed to meet the requirements for exposure to radio waves established by the Federal Communications Commission (USA).

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

3. Temperature Limit Characteristics

Parameter	Min	Max	Unit
Storage temperature	-40	125	°C
Operating temperature	-40	85	°C

4. Commands Format

4.1. Definition

The format of commands/indications in this document uses the following syntax:

\r carriage return

\n line break

<...> command elements. Inside angle brackets. Angle brackets are not included in the command.

[...] Optional command elements. Inside angle brackets. Angle brackets are not included in the command. Optional command elements can be ignored in the command and they may not appear in the indication.

4.2. Format

Commands format in this programming manual: AT command.

4.2.1. AT Commands

AT command is composed of ASCII characters, and it ends with “\r” (0x0d). Therefore, it should avoid using “\r” (0x0d) in the command. Once “\r” is appeared in the command, all data following “\r” will be discarded.

● Command

Command is sent from host to module in order to control the module to perform corresponding operations. The command is composed of three parts: prefix starting with “AT+”, command, suffix ending with “\r”. Command format is as follows:

Query: AT+<COMMAND>? \r

Set: AT+<COMMAND>=< Parameter > [, < Parameter >...]\r

AT+

Command prefix

< COMMAND >	Command. For example: NAME
<Parameter>	Parameter. At least one parameter. Numbers should be transferred to ASCII characters.
\r	Indication suffix.

- Indication

Return command results or parameters. The prefix is "\ r \ n", the command, and the suffix is "\r\n". The indication format is as follows:

\r\n+<INDICATION> [:< Parameter >, < Parameter >...]\r\n

\r\n+	Indication prefix
INDICATION	Indication, For example: OK,ERROR,+NAME
Parameter	Parameter. At least one parameter. Numbers should be transferred to ASCII characters.
\r\n	Indication suffix.

5. Commands & Indications

5.1. AT Commands

5.1.1. Query Firmware Version

Command	AT+GFWVER?\r
Indication	\r\n<firmware version>\r\n\r\nOK\r\n
Parameter	firmware version
Note	N/A

5.1.2. Query Configuration Information Version

Command	AT+GVER?\r	
Indication	\r\n<config_version> \r\n\r\nOK\r\n	
Parameter	config_version	Parameter
Note	N/A	

5.1.3. Querying the silent mode

Command	AT+SILENT?\r	
Indication	\r\n+SILENT:<status>\r\n\r\nOK\r\n	
Parameter	status	0- Off, 1- On, default: 0
Note	The so-called silent mode is a mode without status reporting, and the serial port only transmits application data, except for this instruction.	

5.1.4. Set the silent mode

Command	AT+SILENT=<enable>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	enable	enable 0- off, 1- on
Note	When silent mode is disabled: The module displays a message indicating that the connection is successfully established. When silent mode is enabled: The module does not prompt the current connection status and the AT command response result.	

5.1.5. Querying the Device name

Command	AT+NAME?\r
---------	------------

Indication	\r\n+NAME:<name>\r\n\r\nOK\r\n	
Parameter	name	Device name
Note	The default device name is i2616e or i2616e-s+i2616e-u2+i2616e-u6+i2616e	

5.1.6. Set the device name

Command	AT+NAME=<name>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	name	Device name
Note	The maximum length of the device name is 18 bytes. Note: After changing the device name, the broadcast name (scan response data) will change accordingly	

5.1.7. Querying unlocked Information

Command	AT+AUTOUNLOCK?\r	
Indication	\r\n+AUTOUNLOCK:<status>\r\n\r\nOK\r\n	
Parameter	status	0- Off, 1- On
Note	Example Query whether the non-inductive unlock function is enabled	

5.1.8. Setting a non-inductive unlock

Command	AT+AUTOUNLOCK=<enable>\r	
Indication	Success:\r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	

Parameter	enable	0- Off, 1- On
Note	It takes effect after the reset module	

5.1.9. Querying the local Bluetooth address

Command	AT+LBDADDR?\r	
Indication	\r\n+LBDADDR:<bdaddr>\r\n\r\nOK\r\n	
Parameter	bdaddr	Bluetooth address ASCII code: 047F0E4563AE
Note	MSB-First	

5.1.10. Setting the local Bluetooth address

Command	AT+LBDADDR=<bdaddr>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR: :<err_code>\r\n	
Parameter	bdaddr	Bluetooth address ASCII code: 047F0E4563AE
Note	It takes effect after the reset module	

5.1.11. Querying the baud rate of the serial port

Command	AT+BAUD?\r	
Indication	\r\n+BAUD:<baud>\r\n\r\nOK\r\n	
Parameter	baud	Baud rate, default: 115200
Note	N/A	

5.1.12. Set the baud rate of the serial port

Command	AT+BAUD=<baud>\r	
Indication	Success: \r\nOK\r\n	

	Failure: \r\nERROR:<err_code>\r\n	
Parameter	baud	Example:115200
Note	Default value: 115200	
	Commonly used values 9600, 14400, 19200, 38400, 57600, 115200, 230400, 256000, 460800, 500000, 921600.	

5.1.13.Querying the flow control of the serial port

Command	AT+FLOWCTRL?\r	
Indication	\r\n+FLOWCTRL:<status>\r\n\r\nOK\r\n	
Parameter	status	0- Off, 1- On
Note	N/A	

5.1.14.Setting the flow control of the serial port

Command	AT+FLOWCTRL=<enable>\r	
Indication	Success: \r\nOK\r\n	
	Failure:\r\nERROR:<err_code>\r\n	
Parameter	enable	0- Off, 1- On
Note	N/A	

5.1.15.Querying the Bluetooth mode

Command	AT+BTMODE?\r	
Indication	\r\n+BTMODE:<mode>\r\n\r\nOK\r\n	
Parameter	mode	0- slave, 1- master, 2- Master and slave
Note	N/A	

5.1.16.Setting the Bluetooth mode

Command	AT+BTMODE=<mode>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	mode	0- slave, 1- master, 2- Master and slave, 6-DTM
Note	1、 If mode is set to 0/1/2, the system takes effect after the module is restarted 2、 When mode is set to 6, the DTM takes effect immediately. Restart the module and exit the DTM.	

5.1.17. Querying delay parameters

Command	AT+TXDELAY?\r	
Indication	\r\n+TXDELAY:<wake_delay>,<sleep_delay>\r\n\r\nOK\r\n	
Parameter	wake_delay	After the module sends the wake signal, the data is sent after a wake ms delay
	sleep_delay	The mcu and module continuous sleep ms The serial port does not interact, and the mcu goes to sleep
Note	N/A	

5.1.18.Setting delay parameters

Command	AT+TXDELAY=<wake_delay>,<sleep_delay>\r	
Indication	Success:\r\nOK\r\n Failure \r\nERROR:<err_code>\r\n	

Parameter	wake_delay	After the module sends the wake signal, it delays the wake ms before sending the data
	sleep_delay	The mcu and the module are in continuous sleep. The serial port does not interact, and the mcu goes to sleep
Note	N/A	

5.1.19. Querying the wake up mode

Command	AT+WAKEACT?\r	
Indication	\r\n+WAKEACT:<type>,<level>,<keep_time>\r\n\r\nOK\r\n	
Parameter	type	Wake-up mode: 0- pulse wake-up, 1- level wake-up
	level	Level polarity, 0-low, 1-high
	keep_time	Pulse width when the wake type is pulse, Unit: ms
Note	N/A	

5.1.20. Setting the wake up mode

Command	AT+WAKEACT=<type>,<level>,<keep_time>\r	
Indication	Success: \r\nOK\r\n	
	Failure: \r\nERROR:<err_code>\r\n	
Parameter	type	Wake-up mode: 0- pulse wake-up, 1- level wake-up
	level	Level polarity, 0-low, 1-high
	keep_time	Pulse width when the wake type is pulse, Unit: ms
Note	N/A	

5.1.21. Querying the broadcast ADV status

Command	AT+ADV?\r	
Indication	\r\n+ADV:<adv>\r\n\r\nOK\r\n	
Parameter	adv	0- Closed; 1- Enabled
Note	N/A	

5.1.22. Setting the broadcast ADV status

Command	AT+ADVDATA=<data>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	adv	0- Stop broadcasting; 1- Enable the broadcast
Note	N/A	

5.1.23. Querying the broadcast interval

Command	AT+ADVPARAM?\r	
Indication	\r\n+ADVPARAM:<adv_interval>\r\n\r\nOK\r\n	
Parameter	adv_interval	Broadcast interval, unit 0.625ms, default 320(200ms)
Note	The smaller the broadcast interval, the easier it is to search, but the greater the power consumption	

5.1.24. Setting the broadcast interval

Command	AT+ADVPARAM=<adv_interval>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	adv_interval	Broadcast interval, unit 0.625ms, range [32, 16384]
Note	The smaller the broadcast interval, the easier it is to search, but the greater the power consumption	

5.1.25. Querying Broadcast Data

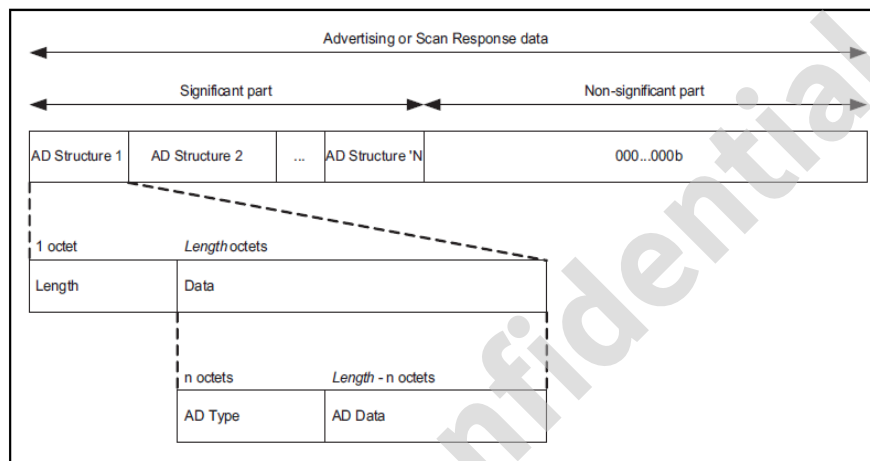
Command	AT+ADVDATA?\r	
Indication	\r\n+ADVDATA:<data>\r\n\r\nOK\r\n	
Parameter	data	ASCII representation of broadcast HEX data

Note	The data in the entire broadcast packet
------	---

5.1.26. Setting Broadcast Data

Command	AT+ADVDATA=<data>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	data	Broadcast data within 31 bytes Note: The first three bytes of data must be 020106

The broadcast data structure is as follows:



The broadcast data/scan response data consists of multiple AD structures. Each AD Structure consists of three parts.

Length: 1 byte, indicating the total length of AD Type and AD Data.

AD Type: 1 byte, specified and published by the Bluetooth Alliance of Organizations, can be downloaded from the official Bluetooth website related documentation, The commonly used AD types are 0x01 (device flag), 0x08 (abbreviated device name), 0x09 (full device name), 0x0A (transmitted power), 0x19 (device appearance), and 0xFF (vendor defined data).

5.1.27. Querying scan response data

Command	AT+SRDATA?\r	
Indication	\r\n+SRDATA :<data>\r\n\r\nOK\r\n	
Parameter	data	The format is the same as broadcast data
Note	Reference: AT+ADVDATA=<data>\r Note: The broadcast name is a fixed field and is not displayed here.	

5.1.28. Setting scan response data

Command	AT+SRDATA=<data>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	data	Scan response data
Note	Reference:AT+ADVDATA=<data>\r Attention: 1. The device name is included in the scan response data as a fixed field, and there is no need to set it repeatedly. 2. data cannot contain fields whose data type is 0x09 or 0x01. 3. The sum of data length and device name field length cannot exceed 31 bytes.	

5.1.29. Query connection parameters

Command	AT+CONNPARAM?\r	
Indication	\r\n+CONNPARAM:<intervalMin>,<intervalMax>,<connLatency>,<connTimeout>\r\n\r\nOK\r\n	
Parameter	intervalMin	The unit is 1.25ms. The default value is 24
	intervalMax	The unit is 1.25ms. The default value is 48
	connLatency	Number of events that can be ignored by the slave: unit: 1. Default value: 0
	connTimeout	Connection timeout duration: unit: 10ms. Default value: 400
Note	N/A	

5.1.30. Setting connection parameters

Command	AT+CONNPARAM=<intervalMin>,<intervalMax>,<connLatency>,<connTimeout>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	intervalMin	Minimum connection interval, unit 1.25ms, range [6-3200]
	intervalMax	Max connection interval, unit 1.25ms, range [6-3200]
	connLatency	Number of ignorable events by slave, unit 1, range [0-443]
	connTimeout	Connection timeout, unit: 10ms, range [3-1000]

Note	The relationship between parameters must meet: Min <= Max Max * (Latency + 1) * 3 <= Timeout * 8
------	---

5.1.31. Querying scan parameters

Command	AT+SCANPARAM?\r	
Indication	\r\n+SCANPARAM:<scan_interval>,<scan_window>,<scan_type>\r\n \r\nOK\r\n	
Parameter	scan_interval	Scan interval, default 128(80ms)
	scan_window	Scan window, default 64(40ms)
	scan_type	Scan type 0-Passive Scanning 1-Active scanning (默 Default value)
	0:Passive Scanning The peer end does not respond to data	
Note	N/A	

5.1.32. Set scan parameters

Command	AT+SCANPARAM=<scan_interval>,<scan_window>,<scan_type>\r	
Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	scan_interval	Scanning interval, unit 0.625ms, range [4,16384]
	scan_window	Scan window, unit 0.625ms, range [4,16384]
	scan_type	Scanning type: 0:Passive Scanning, 1:Active scanning
Note	scan_window<=scan_interval	

5.1.33. Searching for BLE devices

Command	AT+SCAN=<scan>\r	
Indication	\r\nOK\r\n\r\n+ADVINFO:<addr>,<addr_type>,<rss>,<adv_data>\r\n	
Parameter	scan	1- Start search; 0- Stop search
	addr	mac address of the peer device
	addr_type	Indicates the address type of the peer device
	rss	Signal strength of the peer device
	adv_data	The broadcast/scan response data of the peer device must be parsed according to the broadcast data format of AT+ADVDATA.
Note	N/A	

5.1.34. Querying the GATT MTU

Command	AT+GMTU?\r	
Indication	\r\n+GMTU:<mtu>\r\n\r\nOK\r\n	
Parameter	mtu	Maximum transmission unit. The default value is 512
Note	N/A	

5.1.35. Set the GATT MTU

Command	AT+GMTU=<mtu>\r	
Indication	Success: \r\nOK\r\n	
	Failure: \r\nERROR:<err_code>\r\n	
Parameter	mtu	Maximum transmission unit, range [20-512]
Note	Restarting the module takes effect	

5.1.36. Set the GATT Client UUID

Command	AT+CSVCUUID=<service_uuid >\r	
---------	-------------------------------	--

Indication	Success: \r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	service_uuid	16 bits: FF00 AT+CSVCUUID=FF00\r 128 bits: 0000FF00-0000-1000-8000-00805F9B34FB AT+CSVCUUID=FB349B5F800000800010000000FF0000\r
Note	If the module is used as a host or the master/slave system, restarting the module takes effect.	

5.1.37. Set the UUID sent by the GATT Client

Command	AT+CWRTUUID=<write_uuid>\r	
Indication	Success:\r\nOK\r\n Failure: \r\nERROR:<err_code>\r\n	
Parameter	write_uuid	16 bits: FF02 AT+CWRTUUID=FF02\r 128 bits: 0000FF02-0000-1000-8000-00805F9B34FB AT+CWRTUUID=FB349B5F800000800010000002FF0000\r
Note	If the module is used as a host or the master/slave system, restarting the module takes effect	

5.1.38. Set the GATT Client to receive UUID

Command	AT+CNTFUUID=<notify_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	notify_uuid	16 bits: FF01 AT+CNTFUUID=FF01\r 128 bits: 0000FF01-0000-1000-8000-00805F9B34FB AT+CNTFUUID=FB349B5F800000800010000001FF0000\r
Note	If the module is used as a host or the master/slave system, restarting the module takes effect	

5.1.39. Set the GATT Client flow control UUID

Command	AT+CFCUUID=<flowctrl_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	flowctrl_uuid	16 bits: FF03 AT+CFCUUID=FF03\r 128 bits: 0000FF03-0000-1000-8000-00805F9B34FB AT+CFCUUID=FB349B5F800000800010000003FF0000\r
Note	If the module is a slave, restart the module to take effect	

5.1.40. Setting the GATT Server UUID

Command	AT+SSVCUUID=<service_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	service_uuid	Local service UUID 16 bits: FF00 AT+SSVCUUID=FF00\r 128 bits: 0000FF00-0000-1000-8000-00805F9B34FB AT+SSVCUUID=FB349B5F800000800010000000FF0000\r
Note	If the module is a slave, restart the module to take effect	

5.1.41. Set the UUID received by the GATT Server

Command	AT+SWRTUUID=<write_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	write_uuid	Local service receives feature UUID 16 bits: FF02 AT+SWRTUUID=FF02\r 128 bits: 0000FF02-0000-1000-8000-00805F9B34FB AT+SWRTUUID=FB349B5F800000800010000002FF0000\r

Note	If the module is a slave, restart the module to take effect
------	---

5.1.42. Set the UUID sent by the GATT Server

Command	AT+SNTFUUID=<notify_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	notify_uuid	Local service sends characteristic UUID 16 bits: FF01 AT+SNTFUUID=FF01\r 128 bits: 0000FF01-0000-1000-8000-00805F9B34FB AT+SNTFUUID=FB349B5F800000800010000001FF0000\r
Note	If the module is a slave, restart the module to take effect	

5.1.43. Setting the GATT Server Flow control UUID

Command	AT+SFCUUID=<flowctrl_uuid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	flowctrl_uuid	Local service flow control feature UUID 16 bits: FF03 AT+SFCUUID=FF03\r 128 bits: 0000FF03-0000-1000-8000-00805F9B34FB AT+SFCUUID=FB349B5F800000800010000003FF0000\r
Note	If the module is a slave, restart the module to take effect	

5.1.44. Querying the GATT Client/Server UUID

Command	AT+CSVCUUID?\r	
Indication	\r\n+CSVCUUID:<service_uuid>\r\n\r\nOK\r\n	
Parameter	service_uuid	Target device service UUID
Note	CWRTUUID/CNTFUUID/CFCUUID/SSVCUUID/SWRTUUID The /SNTFUUID/SFCUUID command format is the same as that of CSVCUUID	

5.1.45. Querying the authentication function

Command	AT+AUTH?\r	
Indication	\r\n+AUTH:<enable>\r\n\r\nOK\r\n	
Parameter	enable	0- Off, 1- On
Note	N/A	

5.1.46. Setting the authentication function

Command	AT+AUTH=<status>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	status	0- Off, 1- On
Note	1. Valid only when the local server serves as the server. 2. Restart the module to take effect.	

5.1.47. Querying the transmit power

Command	AT+TXPOWER?\r	
Indication	\r\n+TXPOWER:<power>\r\n\r\nOK\r\n	
Parameter	power	Transmit power level, default value 9
Note	power is an integer in the range [0,9], refer to the Settings instruction	

5.1.48. Setting the transmit power

Command	AT+TXPOWER=<power>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	power	Transmit power rating, range [0-9]
Note	1. Restart the module to take effect	

	2. The mapping between values is as follows:										
	power	0	1	2	3	4	5	6	7	8	9
	power/dBm	-20	-12	-8	-4	-2	0	+2	+3	+4	+6

5.1.49. Querying TRIM

Command	AT+TRIM?\r	
Indication	\r\n+TRIM:<trim>\r\n\r\nOK\r\n	
Parameter	trim	Reference frequency, default value 8000000
Note	Instructions related to Bluetooth frequency offset calibration	

5.1.50. Setting TRIM

Command	AT+TRIM=<trim>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	trim	Reference frequency, range (700200,8008000)
Note	Instructions related to Bluetooth frequency offset calibration	

5.1.51.Fixed frequency transmission

Command	AT+FREQ=<freq>,<timeout>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	freq	Frequency /KHz, even in the range [2402-2480]
	timeout	Timeout period /ms, range [0-65535]
Note	Automatically reset after timeout	

5.1.52. Querying whitelist devices

Command	AT+WLST?\r	
Indication	\r\n+WLST:<idx_0>,<addr_0>;<idx_1>,<addr_1>;...\r\n\r\nOK\r\n	
Parameter	idx	Device index
Note	addr	Device address
	N/A	

5.1.53. Adding whitelisted devices

Command	Format 1: AT+WLST=<addr>\r Format 2: AT+WLST=<cid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	cid	Channel number: 0000-0003
	addr	Target device address
Note	N/A	

5.1.54. Deleting whitelisted devices

Command	Format 1: AT+DWLST=<addr>\r Format 2: AT+DWLST=<idx>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	idx	Device index number
	addr	Target device address
Note	N/A	

5.1.55. Restore factory Settings

Command	AT+FACTORYRESET\r
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n
Parameter	N/A
Note	1、 This command also deletes the whitelist and pairing record 2、 After the factory configuration is restored, the module restarts automatically

5.1.56. RESET

Command	AT+RESET\r
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n
Note	The baud rate is too low and there may be no response

5.1.57. Connect

Command	AT+CONNECT=<addr_type>,< bdaddr >\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	bdaddr	mac address of the target device
	addr_type	0-public address 1-random address
Note	Only the specified Service and Characteristic are supported (through the AT + CSVCUUID/CWRTUUID CNTFUUID/CFCUUID Settings)	

5.1.58. Disconnect

Command	AT+DISCONN=<cid>\r
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n

Parameter	cid	Channel number: 0000-0003
Note	N/A	

5.1.59. Querying the real-time MTU of the device

Command	AT+CONNMTU?\r	
Indication	\r\n+CONNMTU:<cid_0>,<mtu_0>;<cid_1>,<mtu_1>;...\r\n\r\nOK\r\n	
Parameter	cid	Channel number: 0000-0003
	mtu	Range [20-512]
Note	If there is currently no connection, return\r\n+CONNMTU:\r\n\r\nOK\r\n	

5.1.60. Querying Connected devices

Command	AT+CONNDEV?\r	
Indication	\r\n+CONNDEV:<cid_0>,<addr_0>;<cid_1>,<addr_1>;...\r\n\r\nOK\r\n	
Parameter	cid	Channel number: 0000-0003
	addr	Address of the peer device
Note	If there is currently no connection, return \r\n+CONNDEV:\r\n\r\nOK\r\n	

5.1.61. Querying the pairing confirmation function

Command	AT+PAIRCONFIRM?\r	
Indication	\r\n+PAIRCONFIRM:<status>\r\n\r\nOK\r\n	
Parameter	status	0- Disabled 1- Enabled
Note	Whether the pairing process requires application layer validation	

5.1.62. Setting the pairing confirmation function

Command	AT+PAIRCONFIRM=<enable>\r	
---------	---------------------------	--

Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	enable	0- Disabled 1- Enabled
Note	N/A	

5.1.63. Querying pairing Input and output capabilities

Command	AT+IOCAP?\r	
Indication	\r\n+IOCAP:<iocap>\r\n\r\nOK\r\n	
Parameter	iocap	Default value: 0
Note	Switching input/output Capability for Bluetooth pairing (IO Capability)	

5.1.64. Setting the input/output pairing capability

Command	AT+IOCAP=<iocap>\r														
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n														
Parameter	iocap	Input and output capability. The value can be: <table><tr><td>iocap</td><td>Description</td></tr><tr><td>0</td><td>DISPLAY_ONLY</td></tr><tr><td>1</td><td>DISPLAY_YES_NO</td></tr><tr><td>2</td><td>KEYBOARD_ONLY</td></tr><tr><td>3</td><td>NO_INPUT_NO_OUTPU</td></tr><tr><td>4</td><td>KEYBOARD_DISPLAY</td></tr></table>		iocap	Description	0	DISPLAY_ONLY	1	DISPLAY_YES_NO	2	KEYBOARD_ONLY	3	NO_INPUT_NO_OUTPU	4	KEYBOARD_DISPLAY
iocap	Description														
0	DISPLAY_ONLY														
1	DISPLAY_YES_NO														
2	KEYBOARD_ONLY														
3	NO_INPUT_NO_OUTPU														
4	KEYBOARD_DISPLAY														
Note	N/A														

5.1.65. Querying the pairing code

Command	AT+PASSKEY?\r	
Indication	\r\n+PASSKEY:<passkey>\r\n\r\nOK\r\n	
Parameter	passkey	The default value is 123456
Note	N/A	

5.1.66. Setting the pairing code

Command	AT+PASSKEY=<passkey>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	passkey	6-digit pairing code, range [0-999999]
Note	N/A	

5.1.67. Pairing Confirmation

Command	AT+PAIR=<cid>,<enable>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	cid	Channel number: 0000-0003
	enable	0- Cancel pairing 1- Allow pairing
Note	N/A	

5.1.68. Enter the pairing code

Command	AT+PSKENTRY=<cid>,<passkey>\r	
Indication	Success:\r\nOK\r\n	

	Failure:\r\nERROR:<err_code>\r\n	
Parameter	cid	Channel number: 0000-0003
	passkey	Pairing code, range [0-999999]
Note	N/A	

5.1.69. Querying multiple connection support

Command	AT+MULTICONN?\r	
Indication	\r\n+MULTICONN:<status>\r\n\r\nOK\r\n	
Parameter	status	0- Multiple connection closed; 1- Multiple connections are enabled
Note	Multiple connections: 1, the slave mode/master mode can connect up to 3 devices 2, master and slave mode master and slave each 1	

5.1.70. Setting Multiple connection support

Command	AT+MULTICONN=<enable>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	enable	0- Disable multiple connections; 1- Enable multiple connections
Note	1、 Before enabling multiple connections, you need to enable the PDU mode. 2、 This command is not recommended during the presence of connected devices.	

5.1.71. Querying the PDU mode

Command	AT+COMMAND?\r	
Indication	\r\n+COMMAND:<enable>\r\n\r\nOK\r\n	
Parameter	enable	0- Closed; 1- Enabled
Note	In PDU mode, data is sent and received by command	

5.1.72. Setting the PDU mode

Command	AT+COMMAND=<status>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	status	0- Closed; 1- Enabled
Note	1、 Before disabling the PDU mode, disable multiple connections. 2、 This command is not recommended during the presence of connected devices.	

5.1.73. Sending data in PDU mode

Command	AT+SNED=<cid>,<len>,<data>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	cid	Channel number: 0000-0003
	len	The length of the sent data
	data	Send data
Note	len do not exceed MTU	

5.1.74. The PDU mode is disconnected

Command	AT+DISCONN=<cid>\r	
Indication	Success:\r\nOK\r\n Failure:\r\nERROR:<err_code>\r\n	
Parameter	cid	Channel number: 0000-0003
Note	N/A	

5.2.AT indication

5.2.1. Ready status indication

Command	\r\nIM_READY\r\n	
Parameter	N/A	
Note	Initialization is complete	

5.2.2. Connection status indication

Command	\r\nIM_CONN,<cid>\r\n	
Parameter	cid	Channel number: 0000-0003
Note	For example, \r\nIM_CONN,0001\r\n	

5.2.3. Disconnect instructions

Command	\r\nIM_DISC,<cid>\r\n	
Parameter	cid	Channel number: 0000-0003 It is reported when connected
Note	For example, \r\nIM_DISC,0001\r\n	

5.2.4. Connection Timeout indication

Command	\r\nIM_CTO\r\n
Parameter	N/A
Note	Reported only during the primary connection

5.2.5. Service mismatch indicator

Command	\r\nIM_NOSVC\r\n
Parameter	N/A
Note	Reported only during the primary connection

5.2.6. Pairing request instructions

Command	\r\nIM_PAIR,<cid>\r\n	
Parameter	cid	Channel number: 0000-0003
Note	For example: \r\nIM_PAIR,0001\r\n	

5.2.7. Pairing code indication

Command	\r\nIM_DISPPSK,<cid>,<passkey>\r\n	
Parameter	cid	Channel number: 0000-0003
	passkey	PIN code
Note	For example:\r\nIM_DISPPSK,0001\r\n	

5.2.8. Pairing code request instructions

Command	\r\nIM_PSKENTRY,<cid>\r\n	
Parameter	cid	Channel number: 0000-0003
Note	For example: \r\nIM_PSKENTRY,0001\r\n	

5.2.9. Pairing completion instructions

Command	\r\nIM_AUTH,<cid>,<addr>\r\n	
Parameter	cid	Channel number: 0000-0003
Note	addr	Address of the peer device
	For example: \r\nIM_AUTH,0001,047f0e123456\r\n	

6. Company Profile

Barrot Technology – Barrot is a world leading one-stop chipset level solution provider who offers wireless connectivity and audio intelligent hardware solutions featuring with own IPs. The company is an associated member of The Bluetooth SIG, and it is the only one who contributes to Bluetooth specification definition in Greater China. Barrot owns three high-tech IPs: Bluetooth RF, Bluetooth stack and Acoustic algorithms, so Barrot offers most integrated, robust, reliable, and easy-to-use wireless turn-key solutions for IOT, Automotive and Wireless audio applications.

Barrot devotes itself to being the most reliable short distance wireless technologies' solution provider in the world.

7. Contact Information

7.1. Beijing

Beijing Tel: +86 10 82702580

Fax: +86 10 82898219

Address: A1009, Block A, Jia Hua Building, No.9 Shangdisanjie St, Haidian District,

Beijing

Marketing Email: marketing@barrot.com.cn

Support: support@barrot.com.cn

Web site: www.barrot.com.cn

7.2. Shenzhen

Shenzhen Tel: +86 755 27885822-603

Address: Floor 5, building 1, COFCO Business Park, district 67, Xingdong community,
Xin'an Street, Bao'an District, Shenzhen City, Guangdong Province

Support: support@barrot.com.cn

Web site: www.barrot.com.cn

7.3. Shanghai

Address: 2nd Floor, No. 500, Bibo Road, Zhangjiang Gaoke, Pudong New Area, Shanghai

Support: support@barrot.com.cn

Web site: www.barrot.com.cn

8. Copyright

All rights including copyright reserved ©2023 Barrot Technology Co.,Ltd

The Bluetooth trademark is owned by The Bluetooth SIG, and the usage of this trademark is licensed to Barrot Technology Co.Ltd.

Other trademarks included in this document are owned by their respective owners.