Combo module general instructions

Version V4.18P_3.6.0

Revision History

Document Version	Update time	updater	Reviewer	Important changes
DOC - V 0.0.0 (Not published)	2021/8/10	Yang Bin	Software Department+ Xu Hong	Preliminary review of combo v2 version AT command set
DOC-V0.0.1 (Not published)	2021/8/17	Yang Bin	Chen Zifeng	Add Bluetooth related instructions and modify the format
DOC-V0.0.2 (Not published)	2021/8/24	Yang Bin	Chen Zifeng	Modified URC data definition Added detailed descriptions of some nouns (no functional changes) Add some error codes AT+WJAP? Change the query encryption mode to string display and delete the execution operation AT+WAUTOCONN deletes the execution operation +EVENT:SocketDown add data option AT+SOCKETDEL Modify the description string Add AT+SOCKETSENDLINE, AT+SOCKETRECVCFG
DOC-V1.0.0 (combo-v2.0.0)	2021/10/8	Yang Bin	Chen Zifeng	Add MQTT, HTTP related instructions, add URC data and error return code
DOC-V1.0.0 (combo-v2.1.0)	2021/11/1	Yang Bin	Chen Zifeng	Added Bluetooth URC data and error codes AT+BLEMODE adds Bluetooth off state Added AT+WCOUNTRY command Modify the Bluetooth power display content and add the maximum and minimum value display Modify the Bluetooth transparent transmission channel description Modify the parameter unit of AT+BLECONINTV Modify the AT+BLEADVINTV parameter unit
DOC-V1.1.	2021/11/26	Yang	Chen	Added Bluetooth setting precautions description

0 (combo-v2.2.0)		Bin	Zifeng	Added Realtek precautions description MQTT adds the Retained option (the previous version was not released so no major version will be updated this time)
DOC-V1.2.0 (combo-v2.3.0)	2021/12/7	Yang Bin	Chen Zifeng	MQTT adds will message
DOC - V1.3.0	2021/ 12 / 21	Xiong Wenqiang	Chen Zifeng	Simplify I O , serial port , pwm command , synchronize 8258 , 6212 , 6252 series Bluetooth
DOC-V1.4.0 (combo-v2.4.0)	2021/12/24	Xiong Wenqiang Yang Bin	Chen Zifeng	1. Serial port configuration command AT+UARTCFG cancels the flow control setting (the default configuration is no flow control) 2. Delete IO read and write commands AT+SYSIOSETCFG AT+SYSIOGETCFG 3. The AT+SYSGPIOWRITE command is executed once by default to set the GPIO to output mode. 4. The AT+SYSGPIOREAD command is executed once by default and the GPIO is set to floating input mode 5.AT+PWMCFG duty cycle use time control 6. Added AT+PWMCFGS command (use 100% to indicate duty cycle) 7.AT+PWMDUTYSET duty cycle usage time control 8. Added AT+PWMDUTYSETS (use duty cycle) 9. Modify the AT+WAPDHCP command parameters. Disabling DHCP also requires setting IP information. 10. Add AT+BLECONNECT single Bluetooth connection 11. Added error codes
DOC-V1.5.0 (combo-v2.5.0)	2021/12/31	Xiong Wenqiang Yang Bin	Chen Zifeng	1. Bluetooth scanning format correction 2. Automatically enter transparent transmission mode after Bluetooth connection 3. AT+ BLEIBCNDATA new query command 4. AT+PWMCFGS and AT+PWMDUTYSETS command description issues 5. Change the Bluetooth query MAC format to lowercase 6. Modify the Bluetooth slave broadcast data

DOC-V1.6.0 (combo-v2.7.0)	2022/1/24	Yang Bin	Chen Zifeng	1. Add mobile phone network configuration instructions 2. Serial port configuration command AT+UARTCFG cancels flow control settings (the code was updated last time but the document was not updated) 3. AT+WAP? Check the added client list display
DOC-V1.7.0 (combo-v2.8.0)	2022/2/9	Yang Bin	Chen Zifeng	1. Start log to add the default processing when MAC and serial number are empty 2. Added prompt information when client connection is disconnected in AP mode
DOC-V1.7.1 (combo-v2.8.0)	2022/2/21	Xiong Wenqiang	Chen Zifeng	1. Update Bluetooth notes information
DOC-V1.7.2 (combo-v2.10.0)	2022/2/22	Yang Bin	Chen Zifeng	1. Modify UDP transparent transmission logic, single UDP client and single UDP server support original port transparent transmission mode 2. AT+SOCKETTT adds setting command 3. GPIO command pin sorting changed to start from 1 (previously started from 0) 4. AT+SOCKET adds SSL server/client options 5. New error code type 6. Modify the prompt message after the socket connection is successful
DOC -V1.7.3 (combo-v2.1 1 .0)	2 022/7/7	Yang Bin		1. Added AT+MQTTPUBRAM command 2. AT+LEDTEST command adds extended parameters
- V1.7.4 (combo-v2.1 2 . 2)	2 022/8/22	Yang Bin		1. Fixed the AT+MQTTPUB RAW command writing error 2. Delete AT+WCONFIG Note about B W16 only supporting WiFi network configuration
DOC - V1.8.0 (combo-v2.1 3 . 0)		Yang Bin		1. Added Ai -WB2 series module P WM pin restriction description 2. AT+SOCKET adds the specified conid option
DOC - V 4.18P_1.9.0 (combo-V4.18_P2.15.0)		Yang Bin		1. Delete the AT+GPIOTEST command 2. AT+MQTT adds reconnection function 3. New error code 4. Add unsubscribe command AT+MQTTUNSUB

				5. Fix some writing errors
DOC - V 4.18P_1.9.1 (combo-V4. 18_P2.15.0)		Yang Bin		1. AT+RESTORE will reset the MAC settings by default
DOC-V 4.18P_ 1. 10 . 0 (combo-V4. 18_P2.1 7 .0)		Yang Bin		1. AT+WCONFIG adds AirKiss network configuration parameters 2. AT+SOCKET additional parameter description 3. Added AT+SOCKETAUTOTT command
DOC - V 4.18P_1.11. 0 (combo - V4.18_P2.1 8.0)		Yang Bin		1. Add AT+SSLCRET command
DOC-V 4.18P_ 1. 1 2 . 0 (combo-V4. 18_P2.1 8 .0)		Lin Qiwei		1.AT +WSACN adds scanning parameters 2. Added AT+WSACN OPT command
DOC-V 4.18P_ 1. 13 . 0 (combo-V4. 18_P2.1 9 . 1)		Yang Bin		1. Add +EVENT:Socket AutoDel ,<ConID> URC data 2. AT+WCONFIG adds the network configuration protocol corresponding to the specific module
DOC- V 4.18P_ 1. 13. 1 (combo - V4.18_P2.1 9.3)		Yang Bin		1. Add description of Bluetooth UUID corresponding attributes
DOC-V 4.18P_ 1. 13 . 2 (combo-V4. 18_P2.1 9 . 4)		Lin Qiwei		1. Added command AT+WRSSI

DOC-V 4.18P_ 1. 14 . 0 (combo-V4. 18_P2. 2 1. 0)		Yang Bin		1. Modify the sending and receiving rules description of UDP server and client 2. Bluetooth network configuration adds custom name parameters
DOC-V 4.18P_ 1. 15. 0 (combo- V4.18_P2 . 22. 0)		Yang Bin		1. AT+SLEEP adds sleep configuration parameters 2. URC data WIFI_CONNECT ED is changed to WIFI_CONNECT
DOC-V 4.18P_ 1. 16 . 0 (combo-V4. 18_P2. 24 . 0)		Yang Bin		1. AT+WAUTOCONN adds the function of saving the parameters of reconnecting to WiFi after power-on without verifying the WiFi connection
DOC-V 4.18P_ 1. 17 . 0 (combo-V4. 18_P2. 29 . 0)		Yang Bin		1. Added URC data SocketReconnect 2. Add SNTP related commands 3. MQTT adds SSL connection support
DOC-V 4.18P_1.18. 0 (combo - V4.18_P2.3 1.0)	2023/6/28	Yang Bin		1. Add IOMap mapping tables for each model 2. Add DNS commands AT+WDOMAIN, AT+WDNS
DOC-V 4.18P_ 1. 19 . 0 (combo-V4. 18_P2.3 3 .0)	2023/8/22	Yang Bin		1. Added description of socket ConID data type 2. Fix AT+WDNS title writing error 3. Added AT+WDISCONNECT command 4. AT+HTTPCLIENTLINE add example
DOC - V 4.18P_2.0.0 (combo - V4.18_P2.3 8.0)	2023/9/25	Yang Bin		1. Add AT+BLESENDRAW command 2. Add AT+WJEAP command 3. AT+TRANSENTER adds the setting of whether to automatically enter the transparent transmission configuration 4. Add AT+SYSMSG command 5. New URC data +EVENT:WIFI_GOT_IP +EVENT:WIFI_SCAN_DON

				6. Fix some writing errors 7. Add AT+STAINFO command 8. Add AT+HTTPRAW command
DOC -V4.18P_3.0.0 (combo -V4.18_P2.38.4)	2023/11/1	Yang Bin		1. Add AT+STAINFO example 2. AT+WCONFIG adds WPS configuration parameters 3. AT+SOCKET modify status definition
DOC-V4.18P_3.1.0(combo-V4.18_P2.39.0)	2023/11/15	Yang Bin		1. Added length limit description for AT+SOCKETSENDLINE 2. Added description of subscription limit 3. Added description of data length that can be cached in socket passive mode 4. setting instructions for Ai-M62-M01L-BLI in the attachment 5. Added AT+MQTTVER command
DOC-V4.18P_3.2.0 (combo-V4.18_P2.41.0)	2023/11/23	Yang Bin		1. Added IOMap setting instructions for Ai-M61-32S-BLIAll in the attachment 2. Add active scanning command AT+WSCANACTIV 3. New command AT+SOCKETSENDHEX
DOC-V4.18P_3.3.0 (combo -V4.18_P2.42.3)	2023/12/8	Yang Bin		1. AT+SOCKET adds sample code 2. AT+SOCKETSENDLINE adds sample code 3. AT+SOCKET adds the task deletion status 4. AT+WCONFIG adds blufi network configuration parameters 5. AT+ WCONFIG unified parameters, BL602mode=9 also activates blufi network configuration
DOC -V4.18P_3.4.0		Yang Bin		1. Added Bluetooth UUID support for 16-bit mode 2. Added Bluetooth UUID mode support list description 3. Add AT+MQTTDISCONN command 4. New command AT+MQTT BUF 5. Add event +EVENT:MQTT_MALLOC_ERROR 6. New command: AT+MQTTKEEPALIVE 7. New command AT+WAPINFO
DOC -V4.18P_3.4.1	2024/1/9	Chen Cong		1. AT+SLEEP adds GPIO wake-up mode

DOC - V4.18P_3.5.0	2024/1/31	Yang Bin		1. Modify the transparent transmission description (SSL does not support transparent transmission yet) 2. Add AT+MQTTCRET command 3. New command AT+SOCKET 2 4. New command AT+ FLASHID
DOC - V4.18P_3.5.1	2024/2/21	Yang Bin		1. New command AT+UARTFLOWCONTROL 2. Updated AT+UARTCFG command description
DOC - V4.18P_3.6.0	2024/3/1	Yang Bin		1. BW16 adds support for airkiss network configuration

Content

1. Instruction format and default configuration description

1.1 Serial port default configuration

If there is no special instruction, the AT command serial port and the download serial port use the same serial port, configured as 115200, 8N1

1.2 Startup Information

##

arch:<chip model>,<chip version serial number> //If there is no serial number, it will be displayed as NULL
company:Ai-Thinker|B&T
ble_mac:<Bluetooth MAC> //eg: 94c960123456 (lowercase letters) If this line is not present, it will not be printed
wifi_mac:<WIFI STA MAC> //eg: 94c960123456 (lowercase letters) If this line is not present, it will not be printed.
sdk_version:<SDK version number> //Chip original SDK version number (displayed according to the original SDK version number)
firmware_version:<firmware version number> //Firmware version number, format "release/v1.0.0"

If it is a debug version, you need to change release to debug;
Version lowercase v
Three fields of version number

- The first one indicates that an interface has been deleted or an existing interface has been changed, and other modifications that may cause compatibility issues (fixing printing errors in published content, adding functions or new response content to existing instructions, and adding URC instructions are all incompatible modifications);
- The second version number indicates that content has been added (usually a new instruction has been added), which does not affect compatibility;
- The third field indicates that the bug has been fixed or the logic has been optimized, and there is no modification to the command interface (for example, the status displayed by AT+WJAP? is wrong, but after the bug is fixed, it can be displayed normally according to the document regulations).

compile_time: <compile time: month/day/year/hour/minute/second>

ready

##

Remark:

(1) Use \r\n for line breaks

(2) Customers recommend checking ready to check startup information, and do not recommend checking the firmware version number and compile time (subsequent versions may be updated)

(3) Firmware version number

The firmware version number in the startup information indicates the firmware version number of the module, not the version number of the combo command. The version number of the combo framework needs to be checked through the version query command.

The format is three-part format v major version number.minor version number.iteration number

When the major version number changes, it indicates an incompatible modification (such as deleting an instruction or modifying an existing instruction);

The minor version number indicates that a new interface has been added (new AT commands or backward compatible modifications).

Iterative version numbers indicate bug fixes (does not involve interface modifications)

1.3 Instruction Format

The command CMD[opt][param1,param2,...] ends with a carriage return and line feed (\r\n) (the actual detection is the \n end ASCII code 0x0D, the preceding \r will be ignored)

All line breaks are unified using \r\n

		describe	Example
CMD		Command name (case insensitive)	AT
opt	NA	Without any parameters, the specified command is executed directly.	AT
	?	Query Status	AT?
	=param1,param2,...	Instructions with parameters, multiple parameters are separated by commas. If a parameter contains a comma, it must be enclosed in double quotes (\n cannot appear in the parameter, and the first and last parameters must be enclosed in double quotes when they are empty)	AT=1

1.4 Command response format

1.4.1 Command execution success response format

\r\nOK\r\n //No other messages can be printed in the middle (other messages can be printed in the log port)

1.4.2 Command execution error response format

\r\n+<CMD>:<error_code>\r\nERROR\r\n

//errorno indicates the error code (supported by some platforms). The AT serial port cannot print any other error information (other messages can be printed on the log port)

1.4.3 Query function execution success response format

\r\nQuery result (this is the response field for viewing specific commands, which must be strictly defined and cannot be modified)\r\nOK\r\n

1.4.4 Unknown command response format

Response when no command is matched

Unknown cmd: <all contents of the serial port input, including parameters>

Eg: For example, if ATAA does not exist, then

Entering ATAA\r\n will return Unknown cmd:ATAA

Entering ATAA=123\r\n will return Unknown cmd:ATAA=123

1.5 URC Active Data

//WIFI event

+EVENT:WIFI_DISCONNECT //WIFI disconnected

+EVENT:WIFI_GOT_IP //Get IP

+EVENT:WIFI_CONNECT //wifi connection

+EVENT:WIFI_APCLIENTDISCONNECT:<MAC> //AP mode client disconnects, followed by the MAC address, lowercase without colon

+EVENT:WIFI_APCLIENTCONNECTED:<MAC> //AP mode has a new client connection, followed by the MAC address, lowercase without colon

+EVENT:WIFI_SCAN_DONE //WIFI scan is finished

//SOCKET event

+EVENT:SocketDown,<ConID>,<length>[,<data>] //Receive socket data

+ EVENT:Socket Seed , <seed ConID> , <server ConID> //Receive new client connection

+EVENT:SocketDissconnect,<ConID> //socket disconnected
+EVENT:SocketReconnect,<ConID> //socket disconnected and reconnected successfully
+EVENT:Socket AutoDel ,<ConID> //socket automatically deleted
//MQTT events
+EVENT:MQTT_ MALLOC_ERROR //MQTT malloc error
+EVENT:MQTT_CONNECT //MQTT connection successful
+EVENT:MQTT_DISCONNECT //MQTT connection disconnected
+EVENT:MQTT_SUB,<Topic>,<len>,<data> //Received subscription message
//Bluetooth data
+EVENT:BLE_DISCONNECT //Bluetooth disconnect status
+EVENT:BLE_CONNECTED //Bluetooth connection successful
+DATA :<len>,<data> //Receive Bluetooth transparent data in host mode

//Cloud
aliGenie_data //Data sent by Tmall Genie
+EVENT:CloudDown,<type>,<data>

//Production test
##boot //Development board button trigger signal

1.6 errorno Error code description

//System framework related error code

0: Success

1: The command is not supported (the combo framework contains the command but the current platform has not transplanted or adapted to support it)

2: The command parameters contain unsupported operations (the current platform only supports some operations on this command)

3: Instruction format error (this refers to the wrong number of parameters, for example, two parameters are required, but only one parameter is entered)

4: Parameter error (the parameter content is wrong, for example, a number between 0 and 9 is required, but 10 or xyz is passed in, which is a parameter error)

5: Parameter length error (the command length exceeds the maximum supported length)

31: The current command has not ended and the status needs to be asynchronously reported. This value is used by the state machine to determine the use of the command and no message is returned.

32: Unknown error (or unhandled error type)

//Common error codes

33: malloc error

34 : Failed to read buf

35 : Failed to write buf

36: Configuration error (the configuration loaded from the memory is wrong. For example, if we set the port for OTA upgrade to -1 and check the port error when executing AT+OTA, a configuration error will be reported.)

37: Failed to create task

38: Flash read/write failure

39: Serial port configuration error, unsupported baud rate

40: Serial port configuration error, unsupported data bit

41: Serial port configuration error, unsupported stop bit

42: Serial port configuration error, unsupported parity bit

43: Serial port configuration error, unsupported flow control

44: Serial port configuration failed

45: Username/password error

46: Low power mode error or unsupported low power mode

47: Uninitialized configuration data error (including io mapping data)

63: General error code (without other information)

//wifi related error code

6 4: Wi-Fi is not initialized or initialization fails

6 5: Wi-Fi mode error (unable to connect to Wi-Fi in single AP mode)

6 6: Wi-Fi connection failed

6 7: Wi-Fi connection successful, error in obtaining IP (DHCP)

6 8: Failed to obtain encryption method

69 : The specified AP was not scanned.

70: WiFi scan startup failed

71: Wi-Fi scan timeout

72: Failed to open AP hotspot

73: Failed to obtain the router's wifi information or the AP information that you enabled yourself

74: Network card (STA/AP) is not running

75: Wi-Fi country code error (unsupported Wi-Fi country code)

76: Current network configuration mode is wrong

95 : Wi-Fi connection unknown error

//socket related error code

96 : Failed to create socket

97 : Socket connection failed

98 : DNS failed

99 : Socket status error (for example, TCP is not connected yet)

100 : Socket type error

101 : Socket send failed

102 : Socket receive failed

103: Socket monitoring thread creation failed

104: socket bind error

105 : The current connection cannot be transparently linked (wrong socket type or number)

106 : PING test failed (all packets lost)

107 : PING test has some packet loss

108: SSL Config Error

109: SSL verification error (usually caused by unsupported SSL encryption type or certificate error)

127 : Unknown socket error

//GPIO control related error code

128: GPIO mode error (for example, input is configured, and then output instruction is executed)

129: The IO being operated is not burned into the GPIO mapping table (for example, if the IO mapping of pins 0 to 4 is set, this error will be reported when operating pin 5)

130: NC pin, cannot be controlled (for example, serial port, VCC, GND, etc. are controlled by AT commands)

131: Pin mode setting error or unsupported mode

132: Error in setting GPIO pull-up or pull-down mode is not supported)

133: PWM period not supported by hardware

159: GPIO operation unknown error

//HTTP(S) related error codes

160: HTTP(S) response header format error

191: HTTP(S) request unknown error

//MQTT related

192: MQTT connection mode error

193: MQTT connection failed

194: MQTT configuration error

195: Failed to publish MQTT message

196: The MQTT message subscription list is full

197: MQTT did not receive a response

198: MQTT is busy or the connection has timed out

199: MQTT unsubscribe failed

224: MQTT unknown error

//BLE Bluetooth related

225: Bluetooth startup or shutdown error

226: Failed to set Bluetooth MAC (226: Set Bluetooth MAC; 237: Failed to get Bluetooth MAC)

227: Modifying Bluetooth MAC is not supported

228: Unsupported state or the operation being performed is not allowed in the current state

229: Bluetooth disconnection failed

230: Bluetooth MTU setting failed (236 Failed to obtain MTU)

231: Bluetooth data sending failed

232: Set the Bluetooth slave broadcast status

233: Bluetooth host scan failed

234: The specified Bluetooth was not scanned.

235: Bluetooth connection failed

236: Failed to obtain MTU (230 Failed to set MTU)

237: Failed to obtain Bluetooth MAC (226: Set Bluetooth MAC; 237: Failed to obtain Bluetooth MAC)

255: Unknown Bluetooth error

2. Basic instructions

2.1 AT test command

AT	
describe	Instructions to test whether the AT framework is working properly
response	OK
Example	AT OK
Description information in HELP	
response	Test cmd

2.2 AT+HELP View AT command set

AT+HELP	
describe	Query AT command set list
response	<command name>:<comment> ... <command name>:<comment> OK
Example	
Description information in HELP	
response	Show cmd list

2.3 AT+RST module restart command

AT+RST	
describe	Restart module
response	OK
Example	
Description information in HELP	
response	Soft restart

2.4 AT+RESTORE restores factory settings

AT+RESTORE	
describe	Restore to factory mode and erase configuration information (except triplet and IO mapping)

response	OK
Remark	Automatically restart after success Default parameters:
Example	
Description information in HELP	
response	Restore setting

2.5 ATE1 turns on echo

ATE1	
describe	Turn on echo
response	OK
Example	ATE1 OK
Description information in HELP	
response	Enable echo
Notes	P B series default echo is on TB series default echo is on

2.6 ATE0 turns off the echo

ATE0	
describe	Turn off echo
response	OK
Example	ATE0 OK
Description information in HELP	
response	Disable echo

2.7 AT +SYSMSG query or set system prompt information

AT +SYSMSG?	
describe	Query URC data printing mask
response	+SYSMSG: <mode1>,<mask1> ... <modeN>,<maskN> OK
Example	AT+SYSMSG? +SYSMSG:

	1,FFFFFFFF OK
AT +SYSMSG=<mode>,<mask>,<saveFlash>	
describe	Set URC data printing mask
parameter	mode: specifies the mode in which the mask needs to be set 1: Transparent transmission mode (including socket transparent transmission and Bluetooth transparent transmission) mask: print mask, this is a hexadecimal data of u32 (string length is 8), each bit represents a message, 0 means prohibit printing, 1 means allow printing Bit0: +EVENT:WIFI_DISCONNECT Bit1: +EVENT:WIFI_CONNECT Bit2: +EVENT:WIFI_APCLIENTDISCONNECT:<MAC> Bit3：+EVENT:WIFI_APCLIENTCONNECTED:<MAC> Bit4：+EVENT:SocketDown,<ConID>,<length>[,<data>] Bit5：+EVENT:SocketSeed,<seed ConID>,<server ConID> Bit6：+EVENT:SocketDissconnect,<ConID> Bit7：+EVENT:SocketReconnect,<ConID> Bit8：+EVENT:SocketAutoDel,<ConID> Bit9：+EVENT:MQTT_CONNECT Bit10：+EVENT:MQTT_DISCONNECT Bit11：+EVENT:MQTT_SUB,<Topic>,<len>,<data> Bit12：+EVENT:BLE_DISCONNECT Bit13：+EVENT:BLE_CONNECTED Bit14: +DATA:<len>,<data> Bit15: +EVENT:WIFI_GOT_IP Bit16: +EVENT:WIFI_SCAN_DON saveFlash: 0: effective this time, not saved to flash 1: This time it takes effect and is saved to flash
Example	AT+SYSMSG=1,2468abcd,0 OK
Description information in HELP	
response	Query and set system message

2.8 AT+GMR query version information

AT+GMR	
describe	Query version information
response	<at version:>: AT version information (combo version) <sdk version:>: SDK version information <firmware version:>: Firmware version OK

Example	AT+GMR at version:release/v2.0.0 sdk version:amebaD-6.2c firmware version:release/v1.2.3 OK
Description information in HELP	
response	Show version info

2.9 AT+ FLASHID query FLASH ID

AT+ FLASHID	
describe	Query FLASH ID
response	Flash Manufacturer ID:0xXX Flash Device ID:0xXX Flash Capacity ID:0xXX(XMB) OK
Example	
Description information in HELP	
response	Query FLASH ID
Remark	Compatible models BW16

2.10 AT+SLEEP sleep mode

AT+SLEEP=<mode> [,<wakeup source>,<param1>,<param2>]	
describe	Set Sleep Mode
parameter	Mode: 0: Enter light sleep mode, power on and do not enter light sleep mode automatically 1: Enter light sleep, automatically enter light sleep when powered on 2: Enter deep sleep state 3: Normal mode wakeup source: Set the wakeup source (valid only when mode=0/1/2) 0: Timer wake-up 2: GPIO wake-up param1: Only valid when wakeup source=0/2 When wakeup source=0, it means using timed wakeup. This parameter indicates the timer time in ms. wakeup source=2 means using GPIO for wakeup. This parameter indicates the sequence number of the wakeup pin (counterclockwise from the upper left corner of

	the module, the pin number starts from 1) Param2: Only valid when wakeup source=2, indicating the wakeup level when GPIO wakes up 0: Low level wake-up 1: High level wake-up 2: Falling edge wake-up 3: Rising edge wake-up 4: Double edge wake-up
response	OK
Remark	Wake up the module by sending any data to the serial port
Example	
Description information in HELP	
response	Set low power mode
Notes	P B series is 3, normal mode The default mode of TB series is 3, normal mode Ai-WB2 series supports mode 2/3, the default is 3 Note: When configuring the GPIO wake-up of the Ai-WB2 series, the pin specified by param1 is not mapped, that is, the actual pin of the chip, and only supports the IO7 pin (IO7 is the RX pin, so for serial port wake-up, we generally set the IO7 low level environment, that is, AT+SLEEP=2,2,7,0)

2.11 AT+UARTCFG serial port setting command

AT+UARTCFG?	
describe	Query AT serial port configuration
response	+UARTCFG: <baudrate>,<databits>,<stopbits>,<parity> OK
Example	
AT+UARTCFG=<baudrate>,<databits>,<stopbits>,<parity>	
describe	Set AT serial port configuration command, 6 212 , 6 252 , 8 258 only support baudrate Flow control is off by default, use " AT+UARTFLOWCONTROL " to set
parameter	baudrate : serial port baud rate databits: data bits 5: 5 data bits 6: 6 data bits 7: 7 data bits 8: 8 data bits stopbits : stop bits 1 : 1 stop bit 2 : 1.5 bit stop bit

	3 : 2 stop bits parity : check digit 0: None 1 : Odd 2 : Even
Notes	PB series only supports baudrate TB series only supports baudrate

2.12 AT+UARTFLOWCONTROL serial port flow control settings

AT+UARTFLOWCONTROL?	
describe	Query AT serial port flow control configuration
response	+ UARTFLOWCONTROL : < flowcontrol > OK
Example	AT+UARTFLOWCONTROL? +UARTFLOWCONTROL:0 OK
AT+UARTFLOWCONTROL=< flowcontrol >	
describe	Set AT serial port flow control
parameter	flowcontrol : flow control 0 : No flow control 1 : Enable RTS 2 : Enable CTS 3 : Enable RTS and CTS at the same time
response	OK //Note that OK is replied only after the setting is successful. If flow control is enabled, the receiving end also needs to configure flow control before receiving data
Example	AT+UARTFLOWCONTROL=3 OK
Notes	Compatible models BW16 Series (RTS:PA_14/CTS:PA_15)

2.13 AT+SETDOWNLOADMODE enters download mode

AT+SETDOWNLOADMODE =<mode>	
describe	Enter download mode
parameter	Mode:

	1: Enter serial port download mode
response	OK
Example	
Description information in HELP	
response	Set download mode

2.14 AT+OTA online upgrade command

AT+OTA	
describe	Start an OTA upgrade Note: The upgrade is asynchronous. The OK message only indicates that the startup task is successful, not that the upgrade is successful. After the upgrade is successful, the module will restart and switch to the new firmware.
response	OK
Example	
AT+OTA?	
describe	Query OTA parameters
response	+ OTA : <Mode> , <Host_name> , <Port> , <Route> OK //Status description reference setting parameters
Example	
AT + OTA = <Mode> , <Host_name> , <Port> , <Route>	
describe	Set OTA related parameters
parameter	Mode : Download method 1: HTTP 2: HTTPS Host_name : Server domain name Port : Server port number R oute : the resource address to be downloaded
response	OK
Example	
Description information in HELP	
response	Firmware OTA

3. IO control instructions

3.1 AT+SYSIOMAP queries or sets the IO mapping table

AT+ SYSIOMAP?	
describe	Query the IO pin mapping table
response	+ SYSIOMAP:PinNumber:<PinNumber>,PinMap:< pin 1 >,<pin 2 > ,... ,<pin N > //Status introduction PinNumber: indicates how many groups of data there are in the current mapping table
Example	#AT+SYSIOMAP? +SYSIOMAP:PinNumber:6,PinMap:NC,5,20,NC,15,NC OK
AT+ SYSIOMAP = <PinNumber>,< pin 1 >,<pin 2 > ,... ,<pin N >	
describe	Set IO pin mapping
parameter	pinNumber: The total number of IOs to be set pin xx : The chip pin number corresponding to the module IO pin (counterclockwise from the upper left corner of the module, the pin number starts from 1) (1~254, this can be determined according to the pin number in the chip manual) If the module does not have a corresponding chip pin, set it to NC
response	OK
Example	#AT+SYSIOMAP=4,3,5,NC,1 OK This instruction means A total of 4 IO mapping relationships are set Pin 1 of the module corresponds to pin 3 of the chip; Pin 2 of the module corresponds to pin 5 of the chip; Pin 3 of the module is not connected to the chip or the pin is prohibited from being controlled by AT commands. Pin 4 of the module corresponds to pin 1 of the chip For the IOMap mapping table of each model, please refer to **Appendix 1 IOMap table of each model module**
Description information in HELP	
response	Query and set IO map

3.2 AT+SYSGPIOWRITE sets the GPIO output level

AT+SYSGPIOWRITE=<pin>,<level>	
describe	Set the GPIO output level. The level is 1 , which is pulled up by default . The level is

	0, which is pulled down by default.
parameter	pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1) level ： 0: Low level 1: High level
response	OK
Example	
Description information in HELP	
response	Set GPIO out level

3.3 AT+SYSGPIOREAD reads GPIO level

AT+SYSGPIOREAD=<pin>	
describe	Read GPIO level, floating by default
parameter	pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1)
response	+SYSGPIOREAD:<pin>,<level> OK Status Field Description pin: module IO pin number (sorted counterclockwise from the upper left corner of the module, the pin number starts from 1) level: the level read 0: Low level 1: High level
Example	
AT+ SYSGPIOREAD =?	
response	Get GPIO level
Example	

3.4 AT+PWMCFG configures PWM function

AT+PWMCFG = <pin> , <cycle> , <duty>	
describe	Configuring P WM Function
Notice	Ai -WB2 series modules have 5 PWMs in total . When they are enabled at the same time, it is important to note that the I O numbers of the chip pins cannot be repeated modulo 5, otherwise only one will take effect. For example, if I O1/2/6 is set, only I O2/6 will take effect, and I O1 will be covered by I O6.
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) cycle : pwm cycle duty: duty cycle time

response	OK
Example	
Description information in HELP	
response	Set PWM config
Remark	The unit of this command setting is the chip's cycle register. The same parameter may have different effects on different modules. If the accuracy can meet the requirements, it is recommended to use AT+PWMCFGS setting. The effect of the same parameter of this command on different modules will be basically consistent (different chips may have a difference of a few us)

3.5 AT+P WMCFGS configures the PWM function

AT +PWMCFG S = <pin> , <cycle> , <duty>	
describe	
Notice	Refer to **AT+PWMCFG to configure the PWM function** Notes
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) Cycle : pwm cycle, unit: us duty: integer 0~100 represents the percentage of duty cycle
response	OK
Example	
Description information in HELP	
response	Set PWM config

3.6 AT+PWMSTOP turns off the PWM function

AT+PWMSTOP=<pin>	
describe	Disable PWM function
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1)
response	OK
Example	
Description information in HELP	
response	Stop PWM function

3.7 AT+PWMDUTYSET updates the PWM duty cycle

AT+PWMDUTYSET=<pin>,<duty>	
describe	Update the PWM duty cycle of the specified pin

parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) duty: duty cycle time, unit is us
response	OK
Example	
Description information in HELP	
response	Update PWM duty

3.8 AT+PWMDUTYSET S Update PWM duty cycle

AT+PWMDUTYSET S =<pin>,<duty>	
describe	Update the PWM duty cycle of the specified pin
parameter	pin: The pin on the module (counterclockwise from the upper left corner of the module, starting from 1) duty: integer 0~100 represents the percentage of duty cycle
response	OK
Example	
Description information in HELP	
response	Update PWM duty

4. WIFI Instructions

4.1 Basic instructions

4.1.1 AT+WMODE query or set WIFI working mode

AT+WMODE?	
describe	Query WIFI working mode
response	+WMODE:<MODE> OK
Example	
AT+WMODE= <MODE> ,<save_flash>	
describe	Set the WiFi working mode
para	MODE: WiFi working mode

meter	0: Wi-Fi is not initialized or turned off 1: STA 2: AP 3: AP+STA save_flash: 0: Do not save to flash 1: Save to flash
response	OK
Example	
Notice	If Realtek series (BW16/BW15) has multiple wireless types enabled, they need to be enabled in the specified order. If you enable AP+STA+Bluetooth triple mode, or AP+STA mixed mode, you need to turn on AP first, then connect STA and Bluetooth (there is no requirement for the order of Bluetooth and STA, but AP must be turned on first)
Description information in HELP	
response	Query an set WIFI mode
Notes	BW16 save_flash == 1, MODE does not support 0 (turn off WIFI) when saving falsh

4.1.2 AT+WDISCONNECT disconnects the Wi-Fi connection

AT+WDISCONNECT	
describe	Disconnect the wifi connection. This command will turn off the wifi first and then start it again. This is equivalent to executing AT+WMODE= 0,0 first and then AT+WMODE= x,0 (x indicates the wifi status before the command is executed)
response	OK
Description information in HELP	
response	Disconnect wifi connect

4.1.3 AT+WSCAN scan WIFI list

AT+WSCAN ?	
descr	Scan WIFI list

ibe	
respo nse	+WSCAN:index SSID,CH,SECURITY,RSSI,BSSID <index> <SSID>,<CH>,<SECURITY>,<RSSI>,<BSSID> ...
Exam ple	AT+WSCAN +WSCAN:index SSID,CH,SECURITY,RSSI,BSSID 1 IoT-Connect,9,WPA/WPA2 Mixed,-19,cc:81:da:1f:45:80 2 IoT-Connect_5G,44,WPA/WPA2 Mixed,-30,cc:81:da:1f:45:88 3 super_2G,1,WPA/WPA2 AES,-32,54:75:95:4f:74:5e 4 guo123,11,WPA/WPA2 AES,-34,cc:08:fb:eb:f1:28 5 super_5G,157,WPA/WPA2 AES,-38,54:75:95:4f:74:60 6 aiot@xuhongv,3,WPA/WPA2 Mixed,-41,d8:c8:e9:05:c4:d8 7 MR4519,1,WPA/WPA2 AES,-43,94:d9:b3:20:3f:7f 8 HAP_D96015182,11,WPA2 AES,-44,ec:9c:32:2e:e6:13 9 aiot@xuhongv_5G,36,WPA/WPA2 Mixed,-44,d8:c8:e9:05:c4:e0 10 Aithinker-Visitor1,11,WPA/WPA2 AES,-45,6c:e8:73:aa:2b:e0 11 RAK7258_1A77,6,Open,-46,ac:1f:09:05:1a:77 12 FAE@Seahi,6,WPA/WPA2 AES,-46,b8:f8:83:0d:9e:2a 13 AIOT@FAE,1,WPA/WPA2 Mixed,-47,9c:9d:7e:59:3e:83 14 zifeng,6,WPA/WPA2 Mixed,-48,ec:41:18:4f:fe:d5 15 B&T,1,WPA/WPA2 Mixed,-50,f8:8c:21:b4:4a:38 16 123456789,11,WPA2 AES,-50,2a:3a:4d:88:7e:51 17 AXK,11,WPA/WPA2 Mixed,-50,80:8f:1d:b5:ab:b1 18 xiaomi,11,WPA/WPA2 Mixed,-56,28:6c:07:3c:49:0d 19 MR4519_5G,149,WPA/WPA2 AES,-56,94:d9:b3:20:3f:81 20 B&T,48,WPA/WPA2 Mixed,-58,f8:8c:21:b4:4a:39 21 ChinaNet-HHZm,2,WPA/WPA2 AES,-59,48:a0:f8:46:b2:bd 22 aiDM_LB02K_E7DD,6,Open,-60,3c:71:bf:18:e7:dd 23 MEETING,149,WPA/WPA2 Mixed,-62,ee:26:ca:94:c5:e8 24 Aithinker-Visitor3,6,WPA/WPA2 Mixed,-63,bc:d1:77:4a:b1:56 25 xiaomi,157,WPA/WPA2 Mixed,-64,28:6c:07:3c:49:0e 26 PADS 9.5,13,WPA/WPA2 AES,-65,38:3e:5b:0d:b3:5c 27 PADS 9.5,56,WPA/WPA2 AES,-66,3a:3e:5b:8d:b3:5c 28 ChinaNet-4tcm,1,WPA/WPA2 Mixed,-67,f0:92:b4:84:d2:a1 29 LIU5,153,WPA/WPA2 Mixed,-68,00:90:4c:32:64:d2 30 ChinaNet-JuME,11,WPA/WPA2 AES,-69,6c:38:45:75:66:5d 31 ChinaNet-uL5X,1,WPA/WPA2 Mixed,-71,ca:50:e9:8b:5a:0c OK #
Exam ple	
Description information in HELP	

respo nse	Scan WIFI list
AT+WSCAN=[<ssid>,<mac>,<channel>,<rssi>]	
descr ibe	WIFI scan with filter parameters
para meter	illustrate: 1, empty means skipping the parameter. 2. Can be used in combination with AT+WSCANOPT. ssid: scan the specified SSID mac: scan the specified mac address channel: scan the specified channel number rssi: filter out APs whose signal strength is lower than the rssi parameter value, unit: dBm, default value: -100, range: [-100,40]
respo nse	+WSCAN:index SSID,CH,SECURITY,RSSI,BSSID <index> <SSID>,<CH>,<SECURITY>,<RSSI>,<BSSID> ...
Exam ple	AT+WSCAN=AXK +WSCAN:index,SSID,CH,SECURITY,RSSI,BSSID 1,AXK,149,WPA/WPA2 Mixed,-50,f8:8c:21:b4:40:22 2,AXK,48,WPA/WPA2 Mixed,-57,f8:8c:21:b4:4a:39 3,AXK,161,WPA/WPA2 Mixed,-75,f8:8c:21:b4:3f:62 4,AXK,157,WPA/WPA2 Mixed,-84,f8:8c:21:b4:2d:89 OK

4.1.4 AT+WSCANACTIVE scans the specified SSID in active mode

AT+ WSCANACTIVE =<ssid>	
descr ibe	Active mode scans the specified SSID
para meter	ssid: SSID to be scanned
respo nse	+WSCANACTIVE: SSID,CH,SECURITY,RSSI,BSSID ... OK Response meaning SSID : The scanned SSID

	CH : Scan the specified channel number SECURITY ： Encryption method RSSI : Signal strength BSSID : AP's MAC
Example	AT+WSCANACTIVE=test +WSCANACTIVE:test,44,WPA/WPA2 TKIP,-31, 11 : 22 : 33 : 44 : 55 : 66 OK
Remark	Compatible models BW16

4.1.5 AT+WSDHCP queries or sets DHCP parameters in STA mode

AT+WSDHCP?	
describe	Query DHCP settings in STA mode (information will be saved to flash)
response	+WSDHCP:<MODE>[,<IP>,<MASK>,<GATEWAY>] OK
Example	#AT+WSDHCP? +WSDHCP:0,192.168.31.199,255.255.255.0,192.168.31.1
AT+WSDHCP=<MODE>[,<IP>,<MASK>,<GATEWAY>]	
describe	Set DHCP parameters in STA mode
parameter	MODE: IP acquisition mode 0: Disable DHCP and use static IP 1: Use DHCP to obtain an IP address IP: IP address of the module, which needs to be set for static IP MASK: Subnet mask, required for static IP GATEWAY: Gateway, needs to be set when static IP
response	OK
Example	//Set static IP #AT+WSDHCP=0,192.168.31.199,255.255.255.0,192.168.31.1 OK
Description information in HELP	
response	Query and set STA DHCP

4.1.6 AT+WJAP connects to AP

AT+WJAP? (It is recommended to use AT+STAINFO query. If there is a comma in the SSID or password, it will cause parsing errors)	
describe	Query wifi network information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WJAP: <status>, <ssid>, <pwd>, <bssid> ,<Security>,<MAC>,<ch>,<IP>,<gateway> OK Parameter Introduction status: connection status 0: No wifi connection (initial state or STA mode is not enabled) 1: Connecting to Wi-Fi or reconnecting to Wi-Fi 2: Connected to wifi, but no IP has been obtained 3: Connect to wifi and obtain IP 4: Wi-Fi connection failed (exceeded the number of reconnections but still failed to connect) s sid , bssid , pwd: refer to the setting parameter description Security: Encryption method Open //Open network WEP WPA-TKIP WPA AES WPA Mixed WPA2 AES WPA2 TKIP WPA2 Mixed WPA/WPA2 TKIP WPA/WPA2 AES WPA/WPA2 Mixed WPA2 Enterprise WPA/WPA2 Enterprise WPA3-ASE AES UnknownType //Unknown type MAC: Wi-Fi module MAC address (lowercase characters, separated by colons) ch: connection channel IP: module IP (dot notation) gateway: Gateway address (dot-notation format)
Example	
AT+WJAP=<ssid>,<pwd>[,<bssid>]	
describe	Connect to a specific AP
para	ssid: SSID of the connected AP

meter	pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56)
respo nse	OK
Exam ple	# AT+WJAP=super_2G,123456798 OK
Description information in HELP	
respo nse	Join AP

4.1.7 AT+ STAINFO? Query wifi connection information

AT+ STAINFO?	
descr ibe	Query wifi network information (this is the current status obtained from the hardware, not directly reading our setting value)
respo nse	+ STAINFO : <status> SSID: <ssid> Password: <pwd> <bssid> , <Security>,<MAC>,<ch>,<IP>,<gateway> OK Parameter Introduction status: connection status 0: No wifi connection (initial state or STA mode is not enabled) 1: Connecting to Wi-Fi or reconnecting to Wi-Fi 2: Connected to wifi, but no IP has been obtained 3: Connect to wifi and obtain IP 4: Wi-Fi connection failed (exceeded the number of reconnections but still failed to connect) ssid: SSID of the connected AP pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56) Security: Encryption method Open //Open network WEP WPA-TKIP WPA AES WPA Mixed WPA2 AES WPA2 TKIP

	WPA2 Mixed WPA/WPA2 TKIP WPA/WPA2 AES WPA/WPA2 Mixed WPA2 Enterprise WPA/WPA2 Enterprise WPA3-ASE AES UnknownType //Unknown type MAC: Wi-Fi module MAC address (lowercase characters, separated by colons) ch: connection channel IP: module IP (dot notation) gateway: Gateway address (dot-notation format)
Example	AT+STAINFO? +STAINFO:3 SSID: test Password:123456789 e1 :f 9 :8a:a a :fc:4f,WPA/WPA2 TKIP,b 2 :e 3 :4 1 :c 2 :b 3 :42,5,192.168.3.125,192.168.3.1 OK
response	Query Sta info

4.1.8 AT+WJ E AP connects to enterprise authentication hotspot

AT+WJ EA P= <type>, <ssid>,<identity>,< pwd >	
describe	Connect to a specific AP
parameter	type: EAP encryption method 1: PEAP 2: TLS 3: TTLS 4: FAST ssid: SSID of the connected AP i dentity : login user name pwd: user password
response	OK
Example	AT+WJEAP=1,EAP TEST,test,test +EVENT:WIFI_CONNECT +EVENT:WIFI_GOT_IP

	OK
Description information in HELP	
response	Join E AP
Adapted platform	BW16

4.1.9 AT+WAUTOCONN Automatically reconnect to wifi after power on

AT+WAUTOCONN?	
describe	Check whether the power-on automatic connection function is enabled
response	+WAUTOCONN:<status> //0: do not connect automatically, 1: connect automatically OK
Example	
AT+WAUTOCONN=<status> [,< ssid >,< pwd >,[< bssid >]]	
describe	Enable/disable power-on auto-connect function
parameter	status 0: Disable 1: Enable ssid: SSID of the connected AP pwd: connection password bssid: mac address of the connected AP, in lowercase hexadecimal, separated by colons (when there are multiple SSIDs with the same name, bssid can be used to distinguish them, eg: 94:c9:60:12:34:56) Note: The wifi specified by this command does not check the connection. Even if the information is wrong, it will be automatically saved as automatic connection on power-on. It is generally recommended to use AT+WJAP to successfully connect, verify the connection information is correct, and then use AT+WAUTOCONN= 1 to set automatic connection instead of directly saving the connection information.
response	OK

Example	//Configure the last successfully connected wifi information to automatically connect on power on
	AT+WAUTOCONN= 1
	//Save SSID and password for automatic reconnection on power on

	AT+WAUTOCONN= 1,test01,12345678 //Save SSID and password for automatic reconnection on power on AT+WAUTOCONN= 1,test01,12345678, 94:c9:60:12:34:56
AT+WAUTOCONN=?	
respo nse	Set WIFI auto connect

4.1.10 AT+WAPDHCP query or set DHCP parameters in AP mode

AT+WAPDHCP?	
descr ibe	Query the DHCP settings of AP mode (the information will be saved to flash)
respo nse	+WAPDHCP:<MODE>[,<start_ip>,<end_ip>,<GATEWAY>] OK
Exam ple	
AT+WAPDHCP=<MODE>,<start_ip>,<end_ip>,<GATEWAY>	
descr ibe	Set DHCP parameters in AP mode
para meter	MODE: 0: Disable DHCP 1: Enable DHCP start_ip: DHCP starting address. Eg: 192.168.43.100 end_ip: DHCP end address. Eg: 192.168.43.200 GATEWAY: Gateway IP (the module IP is the gateway IP when using DHCP), which needs to be set when DHCP is enabled. Eg: 192.168.43.1
respo nse	OK
Exam ple	
AT+WAPDHCP=?	
respo nse	Query and set AP DHCP OK
Exam ple	

4.1.11 AT+WAP queries or sets AP mode WiFi parameters

AT+WAP?

describe	Query AP parameter information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WAP:<ssid>,<pwd> ,<security> ,<channel>,<max conn>,<ssid hidden> ,<mac>,<IP>,<Gateway> Client Num: <client number> //Number of client connections (the query result will be accurate only after AP is turned on, otherwise the query may be wrong) Client <id> MAC:<xx:xx:xx:xx:xx:xx> //Client ID and MAC address (lowercase separated by colon) (The query result will be accurate only after AP is turned on, otherwise the query may be wrong) OK //Response description Security: Encryption method, refer to AT+WJAP command Mac: The MAC address of the network card that the module uses to open the AP hotspot IP: module's own IP (dot notation) Gateway: Gateway IP (dot-notation format)
Example	
AT+WAP=<ssid>,<pwd>,<channel>,<max conn>,<ssid hidden>	
describe	Set AP parameters
parameter	ssid : Wi-Fi name pwd: wifi password, an empty string means no password channel: channel max conn: Maximum number of connections (default is 3 if not specified) ssid hidden: whether to hide the SSID , 0 is not hidden, 1 is hidden
response	OK
Example	
Description information in HELP	
response	Query and set AP config

4.1.12 AT+WAP INFO query or set AP information

AT+WAP INFO ?	
describe	Query AP parameter information (this is the current status obtained from the hardware, not directly reading our setting value)
response	+WAP:<ssid>,<pwd> ,<security> ,<channel>,<max conn>,<ssid hidden> ,<mac>,<IP>,<Gateway> Client Num: <client number> Client <id> MAC:<xx:xx:xx:xx:xx:xx> ,IP:<xxx.xxx.xxx.xxx> OK

	//Response description Security: Encryption method, refer to AT+WJAP command Mac: The MAC address of the network card that the module uses to open the AP hotspot IP: module's own IP (dot notation) Gateway: Gateway IP (dot-notation format) client number : the number of client connections (the query result will be accurate only after the AP is turned on, otherwise the query may be wrong) Id : Client ID MAC : MAC address (lowercase with colons) (This query result will be accurate only after the AP is turned on, otherwise the query may be wrong) IP: Client IP, this is only valid in DHCP mode, not in static IP
Example	
Description information in HELP	
response	Query AP info
Notes	This directive is added to the middleware repository

4.1.13 AT+PING: Ping operation

AT+PING=<addr> [,<count>]	
describe	Ping
parameter	addr : IP or domain name Count: ping times, the default is 3 times, loop means pinging does not return (the only option is to restart the module)

response	//success
	+PING: <time>
	OK
	//fail
	+PING:TIMEOUT
	ERROR
	
	//Return value description
	time: average delay

Example	
Description information in HELP	
response	Ping test

4.1.14 AT+CIPSTAMAC_DEF query and modify the wifi station MAC address

AT+CIPSTAMAC_DEF	
describe	Same as AT+CIPSTAMAC_DEF?
AT+CIPSTAMAC_DEF?	
describe	Query the MAC address of the WiFi station
response	+CIPSTAMAC_DEF:<MAC> //MAC format 84f3ebdd9e63 (lowercase without separator) OK
Example	
AT+CIPSTAMAC_DEF=<MAC>	
describe	Set the MAC address of the Wi-Fi station (not supported yet)
parameter	MAC: The MAC address to be set. The MAC format is 84f3ebdd9e63 (lowercase letters without separators).
response	OK
Example	
Description information in HELP	
response	Query and set WIFI station MAC

4.1.15 AT+WCOUNTRY query or set the WiFi country code

AT+WCOUNTRY?	
describe	Query the configured country code
response	+ WCOUNTRY :< country_code > OK
Example	
AT+ WCOUNTRY =< country_code >	
describe	Set country code (effective after restart)
parameter	country_code: country code 0 : // Do not specify a country code, use the SDK default configuration

	1: JP Japan 2: American Samoa 3: CA Canada 4: US 5: CN China 6: HK Hong Kong , China 7 : TW Taiwan 8: MO Macau, China 9: IL Israel 10: Singapore 11: KR Korea 12: TR Turkey 13: AU Australia 14: ZA South Africa 15: BR Brazil
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set WIFI country code

4.1.16 AT+WCONFIG turns on/off mobile phone network configuration

AT+WCONFIG?	
descr ibe	Query the network status
respo nse	+ WCONFIG :< status > OK
Exam ple	
AT+ WCONFIG =< status > [,<name>]	
descr ibe	Set the mobile phone network configuration status
para meter	status: 0 : Disable mobile phone network configuration task 1: Turn on the WiFi network configuration once (network configuration is successful/network configuration timeout will automatically return to the closed state) 2: Enable Bluetooth network configuration once (network configuration is successful/network configuration timeout will automatically return to the closed state)

	3: Enable AirKiss network configuration 9: Enable blufi network configuration 10: WPS network configuration name: This is used to customize the network broadcast name. Currently only the esp BluFi protocol supports this parameter. Network distribution protocol BW16 1: Realtek Simple Config 2: Realtek WiFi Config 3: WeChat AirKiss network configuration 9: Blufi network configuration 10: WPS network configuration Ai-WB2 1: WiFi network configuration (esp touch) 2: Bluetooth network configuration (esp BluFi) 3: WeChat AirKiss network configuration 9: Blufi network configuration
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set WIFI config

4.1.17 AT+WSCANOPT filters WIFI scan display information

AT+ WSCANOPT ?	
descr ibe	Query the set WIFI scan display information
respo nse	+WSCANOPT:<option> OK
Exam ple	AT+WSCANOPT? +WSCANOPT:0xff OK
AT+WSCANOPT=<option>	
descr ibe	Set WIFI scan display information

para meter	option : Whether the WIFI scan result displays the following parameters, default value: 0xFF, if a bit is set to 1, the corresponding parameter will be displayed, if it is set to 0, the corresponding parameter will not be displayed. There are two ways to input option (hexadecimal 0xXY format and decimal format). • bit 0: whether to display <ssid> • bit 1: whether to display <channel> • bit 2: whether to display <security> • bit 3: whether to display <rssi> • bit 4: whether to display <MAC>
respo nse	+WSCANOPT:<option> OK
Exam ple	AT+WSCANOPT=15 +WSCANOPT:0x0f OK AT+WSCANOPT=0x0f +WSCANOPT:0x0f OK

4.1.18 AT+WRSSI query wifi connection signal strength

AT+ WRSSI or AT+ WRSSI?	
descr ibe	Query Wi-Fi connection signal strength
respo nse	+ WRSSI :<rssi> OK
Exam ple	AT+ WRSSI +WSCANOPT:-50 OK

4.2 TCP-IP Instructions

4.2.1 +EVENT:SocketDown sends data through the socket

+EVENT:SocketDown,<ConID>,<length>[,<date>]

describe	This is URC active data, indicating that the data sent by SOCKET has been received.
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that the TCPServer connection cannot send or receive data, and can only send or receive data through the seed created after the client connects to the TCPServer; the UDP Client can only send data, not receive data) length: received data length date: If the socket is in active reading mode, the received data will be printed directly. In passive reading, no data will be printed. Active reading is required to obtain data.
Example	

4.2.2 +EVENT:SocketSeed When TCPServer receives a new connection, it will print this data

+ EVENT:Socket Seed ,<seed ConID> , <server ConID>	
describe	This is URC active data. When the TCP server connects to a new client, it will receive this message.
parameter	seed ConID: ConID of the newly connected client connection) Server ConID: This refers to the server ConID corresponding to the seed ConID
Example	#+Seed:2,

4.2.3 AT+SOCKET creates a socket connection

AT+SOCKET	
describe	Same as AT+SOCKET?
AT+SOCKET?	
describe	Query the created socket link information
response	< ConID >,<type>, <status>, < remote host >,<remote port>,<local port> ,<server ConID> OK //Status details Type : 1: UDP Server 2: UDPClient 3: TCP Server 4: TCPClient

	5: TCPSeed (TCPServer created locally. When other users connect to it using tcpclient, a TCPSeed will be generated) 6: SSLServer 7: SSLClient 8: SSLSeed (an SSLSeed is created when a client connects to the module's SSL server) Status: 0: Not connected/disconnected 1: Connecting 3: Connection successful 4: Connection failed 127: Connection being deleted remote host : The remote address of the client mode connection , which is not set for server mode yet remote port : The remote port for client mode connection. The server mode is not set yet, and the default value -1 is displayed. local port : server mode displays the local listening port. Client mode is not set yet and displays the default value -1 server ConID: When type is TCPSeed, this indicates which TCP server the connection was created from. For other types, the default value is -1
Example	
AT+SOCKET=<type>[,<remote host>],<port>[,<keep alive> ,<conID>]	
describe	Create a socket connection
parameter	type: socket type 1: UDPServer 2: UDPClient 3: TCPServer 4: TCPClient 5: TCPSeed (placeholder type, unavailable, this type is generated when the client connects to the module TCP server and cannot be created actively) 6: SSLServer 7: SSLClient 8: SSLSeed (placeholder type, unavailable, this type is generated when the client connects to the module SSL server and cannot be created actively) remote host: When type is client, this parameter is mandatory, indicating the domain name or IP of the server to be connected. It does not need to be set when it is server (skip directly, eg: AT+SOCKET= 3,10086) port: When type is client, it indicates the port number of the server to connect to. When type is server, it indicates the port number that the local server needs to listen to. keep alive: TCP keep-alive interval, 0 means disabled, 1~7200 means detection interval, unit: seconds (reserved function, not implemented yet) conID : specifies the Con ID of the new connection . The value is u32 type data.

respo nse	connect success ConID=<ConID> OK

Exam
ple
	//Connect to wifi
	AT+WJAP=specter,12345678909
	
	+EVENT:WIFI_CONNECT
	
	OK
	
	+EVENT:WIFI_GOT_IP
	//Create UDPServer
	AT+SOCKET=1,10086
	
	connect success ConID=1
	OK
	//Create UDPClient
	AT+SOCKET=2,192.168.3.10,10086
	connect success ConID=1
	OK
	//Use the domain name to create a tcp client connection
	//Use IP to create a tcp client connection

Description information in HELP	
respo nse	Create socket

4.2.4 AT+SOCKET 2 creates a socket connection

AT+SOCKET 2	
descr ibe	Same as AT+SOCKET?
AT+SOCKET 2 ?	
descr ibe	Same as AT+SOCKET?
AT+SOCKET=<type>,<remote host>,< remotePort > [,< localPort >,<keep alive> ,<conID>]	
descr ibe	Create a socket connection
para meter	type: socket type 1: Placeholder 2: UDPClient 3: Placeholder 4: TCPClient 5: Placeholder 6: Placeholder

	7: Placeholder 8: Placeholder remote host: the domain name or IP of the server to be connected remoteP ort: The port number of the remote server to connect to localPort : The local port number to be bound . If no binding is required, set it to -1 (randomly bind the local port number). keep alive: TCP keep-alive interval, 0 means disable, 1~7200 means detection interval, unit: second (this parameter is invalid in UDP mode) conID : specifies the Con ID of the new connection . The value is u32 type data.
respo nse	connect success ConID=<ConID> OK
Exam ple	
Description information in HELP	
respo nse	Create socket

4.2.5 AT+SOCKETSEND sends data through socket (long data mode)

AT+SOCKETSEND=<ConID>,<length>	
descr ibe	Send data to the specified connection. When the command is executed, a ">" symbol will appear in the second line. After this symbol appears, you can start entering data (you can enter any data, regardless of the data content). When length bytes of data are received, it will stop receiving and start sending (if the length exceeds the maximum length of a single packet, the data will be divided into packets. By default, the data will be divided into packets when it exceeds 1024 bytes) Features: This mode can send data of any length (if it is too long, it will be divided into packets) and can receive any characters
para meter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent After the command is executed, a " > " will be displayed . After receiving this symbol, you can start to enter the data to be sent (you can enter any HEX data, not limited to strings). After receiving length data, it will start to send data.
respo nse	OK
Exam ple	AT+SOCKETSEND=1,3 >123

	OK
Description information in HELP	
respo nse	Socket send data

4.2.6 AT+SOCKETSENDLINE sends data through socket (single line mode)

AT+SOCKETSENDLINE=<ConID>,<length>,<data>	
descr ibe	Send data to the specified connection Features: This mode is relatively simple to use, but the length is limited (the maximum length of an AT command is limited). If there are special characters, the entire parameter needs to be enclosed in double quotes. If there are double quotes in the parameter, escape characters need to be added.
para meter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent data: data to be sent
respo nse	OK

Exam ple	//Connect to wifi
	AT+WJAP=specter,12345678909
	
	+EVENT:WIFI_CONNECT
	
	OK
	
	+EVENT:WIFI_GOT_IP
	//Create UDPClient
	AT+SOCKET=2,192.168.3.10,10086
	connect success ConID=1
	OK
	//Send data to ConID1
	AT+SOCKETSENDLINE=1,5,12345
	
	OK

Description information in HELP	
respo nse	Socket sends data in one line
Exam	

ple	
Notes	The length of data sent in single-line mode is limited, and the total length of the instruction cannot exceed the total length limit of one instruction. The total length of a command is 1023 by default. When ConID is a single digit, the total length of data that can be sent is 1023-26 command format data = 997 bytes

4.2.7 AT+SOCKETSEND HEX sends HEX data via socket single-line mode

AT+SOCKETSEND HEX =<ConID>,<length>,<data>	
describe	Send data to the specified connection
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that TCPServer connections cannot be sent, and data can only be sent to the seed created after the client connects to TCPServer; the UDP server must first receive client data before it can send, and the sending object is the object that receives data for the first time) length: the length of the data to be sent data: data to be sent (the data is hex data in string form)
response	OK
Example	
Description information in HELP	
response	Socket send data in one line by hex
Example	AT+WJAP= test ,12345678 +EVENT:WIFI_CONNECT +EVENT:WIFI_GOT_IP OK AT+SOCKET=4,192.168.3.10,10086 connect success ConID=1 OK //Send 2 bytes of hex data 0x31 0x32 to conid 1 AT+SOCKETSENDHEX=1,2,3132 OK
Notes	The length of data sent in single-line mode is limited, and the total length of the instruction cannot exceed the total length limit of one instruction. The total length of a command is 1023 by default. When ConID is a single digit, the total

	length of data that can be sent is 1023-26 instruction format data = 997 bytes. Two bytes of hex string represent one hex data, so the maximum length of data that can be sent is 997/2=498.

4.2.8 AT+SOCKETREAD reads data from the socket

AT+SOCKETREAD=<ConID>	
describe	Read data from the specified connection Note: When reading, it is read by package, one package of data is read at a time
parameter	ConID: The connection ID obtained after creating a SOCKET connection (note that the TCPServer connection cannot send or receive data, and can only send or receive data to the seed created after the client connects to the TCPServer; the UDP Client needs to send data once before the server obtains the local port before it can send data to the UDP client)
response	+SOCKETREAD:<ConID>,<len>,<data> OK
Example	
Description information in HELP	
response	Socket read data

4.2.9 AT+SOCKETDEL deletes the specified socket connection

AT+SOCKETDEL=<ConID>	
describe	Delete the specified socket connection Note: Since the seed is initiated by the client, the server cannot reconnect, so you need to manually delete the connection after the seed is disconnected (the received data will also be cleared after deleting the connection)
parameter	ConID: The connection ID to be deleted
response	OK
Example	#AT+SOCKETDEL=9 OK
Description information in HELP	
response	Delete socket

4.2.10 AT+SOCKETRECVCFG sets the socket receiving mode

AT+SOCKETRECVCFG=<mode>	
describe	Set the print mode of the socket receiving data
parameter	mode: 0: Passive mode (default). In this mode, after receiving data, only the prompt +EVENT:SocketDown,<ConID>,<length> is printed without printing the data content. 1: Active mode. In this mode, the received socket data is directly printed in the following format +EVENT:SocketDown,<ConID>,<length>,<date>
response	OK
Example	
Description information in HELP	
response	Set socket recive mode
Notes	The data that can be cached in passive mode is stored in RAM in the form of a linked list. If it is not read, it will occupy the memory. When the memory is insufficient, the data cannot be cached anymore and the newly received data will be discarded.

4.2.11 AT+SOCKETTT enters socket transparent transmission mode

AT+SOCKETTT	
describe	Enter SOCKET transparent mode Note: The default transparent transmission object of the UDP server is the client client of the first communication
response	> // Receiving this means that transparent transmission is enabled and data can be sent and received OK // Enter three plus signs in succession to exit transparent transmission. When exiting transparent transmission, print \r\nOK\r\n
Remark	To enter transparent mode, one of the following conditions must be met: Currently there is only one client connection (through client transparent transmission) There is only one server and one seed connection (the seed generated by the client connecting to the module server can be transparently transmitted. This mode must be entered manually and cannot be entered automatically)

	Only one UDPClient There is only one UDPServer (note that it is not recommended to use UDP server in transparent transmission mode. The default transparent transmission object is the first connected client. If other connections initiate communication with the module, subsequent transparent transmission objects may fail.) Enter +++ to exit the transparent transmission mode and enter the AT command mode
Example	#AT+WJAP= test ,123456789 //Connect to wifi OK #AT+SOCKET=4,192.168.31.98,18 //Create tcp client connect success ConID=1 OK #AT+SOCKETTT //Enter transparent transmission mode >send to module //The data sent at this time will be transparently transmitted to the target, and the data sent by the target will be transparently transmitted to the local OK // Exit transparent mode after entering three consecutive plus signs #
AT+SOCKETTT=UDPServerTTMode	
describe	Set the UDP server transparent transmission mode and enter the transparent transmission mode. The current setting mode is only valid when there is only one UDP server.
parameter	UDPServerTTMode: Set the UDP server transparent transmission mode 0: The target of transparent transmission is fixed to the client of the first communication, and the communication target will not be changed if there are other clients communicating later. 2: The transparent transmission object will be dynamically modified to the client of the last communication
response	> // Receiving this means that transparent transmission is enabled and data can be sent and received OK // Enter three plus signs in succession to exit transparent transmission. When exiting transparent transmission, print \r\nOK\r\n
Example	
Description information in HELP	
describe	Start socket transparent transmission

4.2.12 AT+SOCKET AUTOTT automatically enters socket transparent transmission configuration

AT+SOCKETAUTOTT	
describe	Same as AT+SOCKETAUTOTT?

AT+SOCKETAUTOTT?	
describe	Query the current automatic transparent transmission configuration information
response	+SOCKETAUTOTT : <type> , < remote host >,<remote port> OK //Status details Type : 0: Disable automatic entry into transparent mode 1: Automatically enter UDPServer transparent transmission mode 2: Automatically enter UDPClient transparent transmission mode 3: Placeholder type, unavailable 4: Automatically enter TCPClient transparent transmission mode 5: Placeholder type, unavailable 6: Placeholder type, unavailable 7: Placeholder type, unavailable 8: Placeholder type, unavailable remote host : The remote address of the client mode connection , which is not set for server mode yet remote port : The remote port for client mode connection. The server mode is not set yet, and the default value -1 is displayed. local port : server mode displays the local listening port. Client mode is not set yet and displays the default value -1 server ConID: When type is TCPSeed, this indicates which TCP server the connection was created from. For other types, the default value is -1
Example	
AT+SOCKETAUTOTT=<type>[,<remote host>],<port>	
describe	Automatically enter transparent mode after creating the corresponding socket connection After this command is set, it needs to be used with AT+WAUTOCONN. After the configuration is completed, reset will take effect. Automatically connect to wifi after power on (AT+WAUTOCONN configuration) After the Wifi connection is successful, a socket connection is automatically created. After the socket is successfully created, it automatically enters the transparent transmission mode (this command sets it)
parameter	type: socket type 0: Disable automatic entry into transparent mode 1: Automatically enter UDPServer transparent transmission mode 2: Automatically enter UDPClient transparent transmission mode 3: Placeholder type, unavailable 4: Automatically enter TCPClient transparent transmission mode 5: Placeholder type, unavailable 6: Placeholder type, unavailable 7: Placeholder type, unavailable 8: Placeholder type, unavailable

	remote host: When type is client, this parameter is mandatory, indicating the domain name or IP of the server to be connected. It does not need to be set when it is server (skip this parameter, eg: AT+SOCKETAUTOTT= 1 , 10086) port: When type is client, it indicates the port number of the server to connect to. When type is server, it indicates the port number that the local server needs to listen to.
respo nse	OK
Exam ple	AT+SOCKETAUTOTT= 4 , www.baidu.com,80
Description information in HELP	
respo nse	Set socket auto transparent transmission

4.2.13 AT+SSLCRET query and set SSL certificate

AT+SSLCRET=<type>[, <length>]	
descr ibe	Query and set SSL certificate When there is only one parameter, it means to query the content of the currently set certificate. When there are two parameters, it means that the certificate needs to be set. When the certificate is empty, the client does not load the certificate and automatically obtains it.
para meter	type: the certificate type of the operation 1: CA root certificate 2: Client public key 3: Client private key length : certificate length. When this parameter is omitted, it means querying the corresponding certificate. When this parameter is added, it means the length of the certificate to be set.
respo nse	Query Mode +SSLCRET:<type>,<length>,<certificate content> OK Setting Mode > // Receiving this symbol means you can start writing the certificate OK
Exam ple	Setting up certificates AT+SSLCRET=1,10 >1234567890 OK Check certificate AT+SSLCRET=1 +SSLCRET:1,10,1234567890 OK

Description information in HELP	
respo nse	Query and set SSL Cret

4.2.14 AT+ WDOMAIN domain name resolution

AT+WDOMAIN=<server name>	
descr ibe	DNS resolves domain name
respo nse	+WDOMAIN: <IP> OK
Exam ple	AT+WDOMAIN=www.baidu.com +WDOMAIN:14.119.104.189 OK
Description information in HELP	
respo nse	Input host name to get IP

4.2.15 AT+ WDNS sets the DNS server

AT+WDNS ?	
descr ibe	Query DNS resolution server
respo nse	+WDNS: < DNS IP1 > , < DNS IP 2 > OK
Exam ple	AT+WDNS? +WDNS:192.168.3.1,0.0.0.0 OK
AT+WDNS=<"DNS IP1">[,<"DNS IP2">]	
descr ibe	Set up DNS domain name resolution server
para meter	DNS IP1 / DNS IP2 : Domain name resolution server
respo nse	+WDNS: < DNS IP1 >[,DNS IP 2] OK
Exam ple	AT+WDNS=114.114.114.114 +WDNS:114.114.114.114 OK
Description information in HELP	
respo nse	Query and set DNS Server

4.3 MQTT Commands

4.3.1 AT+MQTT MQTT configuration and connection

AT+ MQTT	
describe	Connecting MQTT Note: You need to set the MQTT parameters before executing the connection . If the current MQTT task has been started, it will reconnect if it is executed again (if you change the server, it is recommended to delete all subscriptions and then reconnect)
response	OK Note: This is an asynchronous connection. The OK display only means that the MQTT task has started. The connection status needs to be queried via AT+MQTT? or by waiting for the receipt of URC data "+EVENT:MQTT_CONNECT".
Example	AT+MQTT=1,192.168.202.10 //Set domain name OK #AT+MQTT=2,1883 //Set the port number OK #AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK #AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public OK #AT+MQTT //Connect to MQTT OK # +EVENT:MQTT_CONNECT //MQTT connection successful
AT+MQTT?	

describe	Query MQTT parameters
response	+MQTT:<MQTT_status> , < Host_name > , < Port > , <scheme>,<client_id>,<username>,<password>,<LWT_topic>,<LWT_qos>,<LWT_Retained>,<LWTpayload> OK //status description MQTT_status: MQTT connection status 0: Initial state 1: Connecting 2: Subscribing to messages 3: Connection successful Host_name : Server domain name Port : Server port number scheme: connection method 1: TCP connection 2: SSL connection client_id: MQTT user ID Username: MQTT username password: MQTT password LWT_topic: Will topic LWT_qos: Will QOS LWT_Retained: Will retained LWTpayload: Will message content
Example	#AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public,LWTTOPIC,0,1,123456 OK
AT+MQTT=<key>,<data>	
describe	Setting MQTT parameters Note: Different keys have different settings, so you need to perform multiple settings to set all the parameters.
parameter	key： 1: Set the domain name or IP to connect to 2: Set the server port number 3: Set the connection mode (1: Use TCP connection ; 2: Use SSL connection) 4: Set the client ID 5: Set the user name (maximum length 63 bytes) 6: Set password (maximum length 63 bytes) 7: Set the will message, the format is AT+MQTT=7,<LWT_topic>,<LWT_qos>,<LWT_Retained>,<LWTpayload> LWT_topic: Will topic (no will is required, set this to "") LWT_qos: Will QOS (0/1/2) LWT_Retained: Will retained (0/1)

	LWTpayload: Will message content data: the value to be set
response	OK
Example	AT+MQTT=1,192.168.202.10 //Set domain name OK #AT+MQTT=2,1883 //Set the port number OK #AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK #AT+MQTT=7,"LWTTOPIC",0,1,"123456" //Set the will topic LWTTOPIC, qos0, enable retained, and the load message is 123456; Note: If you do not want a will message, set it to AT+MQTT=7,"",0,0,"" OK
Description information in HELP	
response	Config and connect MQTT
Notes	The default MQTT version is MQTT3.1

4.3.2 AT+MQTT VER Query and set the MQTT version

AT+MQTTVER ?	
describe	Query the current MQTT version
response	+MQTTVER :<version> OK
Example	AT+MQTTVER? +MQTTVER: 3 +OK

AT+MQTTVER =<version>	
describe	Setting the MQTT version
parameter	version ： 3: MQTT 3.1 4: MQTT3.1.1
response	OK
Example	AT+MQTTVER=4 OK
Description information in HELP	
response	Query and set MQTT version

4.3.3 AT+MQTT BUF Query and set the MQTT send and receive buf size

AT+MQTT BUF?	
describe	Query the MQTT buf size (MQTT needs to be restarted to take effect after modification)
response	+MQTT BUF:<sendBufSize>,<reciveBufSize> OK
Example	AT+MQTTBUF? +MQTTBUF:2048,2048 +OK
AT+MQTT BUF=<sendBufSize>,<reciveBufSize>	
describe	Set the MQTT send and receive buf size Notice: This parameter will take effect the next time you connect (if you are currently connected, you need to disconnect and reconnect before it takes effect) This command only sets the size of buf and does not take effect immediately. It will be allocated when the MQTT connection is executed later. Therefore, it should be set reasonably according to the memory. Otherwise, the MQTT task cannot be started due to insufficient memory even after the setting is successful.
parameter	sendBufSize: MQTT send buf size, in bytes reciveBufSize: MQTT receive buf size, in bytes
response	OK
Example	AT+MQTTBUF=1024,4096 OK
Description information in HELP	

respo nse	Query and set MQTT buffer

4.3.4 AT+MQTTK EEP A LIVE query and set the MQTT heartbeat interval

AT+MQTTK EEP A LIVE?	
descr ibe	Query the current MQTT heartbeat interval (MQTT needs to be restarted to take effect after modification)
respo nse	+MQTTK EEP A LIVE:<mqttKeepAliveInterval>,<mqttTcpKeepAliveInterval> OK
Exam ple	AT+MQTTKEEPALIVE? +MQTTKEEPALIVE:60,10 +OK
AT+MQTTK EEP A LIVE=<mqttKeepAliveInterval>,<mqttTcpKeepAliveInterval>	
descr ibe	Set the MQTT heartbeat interval (MQTT needs to be restarted to take effect after modification)
para meter	mqttKeepAliveInterval: MQTT heartbeat interval, unit s mqttTcpKeepAliveInterval: MQTT socket heartbeat interval, unit: s
respo nse	OK
Exam ple	AT+MQTTKEEPALIVE=120,5 OK
Description information in HELP	
respo nse	Query and set MQTT keepalive

4.3.5 AT+MQTTCRET query and set MQTT SSL certificate

AT+MQTTCRET =<type>[,<length>]	
descr ibe	Query and set MQTT SSL certificate Notice: 1. The modification is only saved in RAM and will become invalid after the module is restarted if it is not saved in flash. 2. After the modification, you need to restart MQTT to take effect
para meter	When there is only one parameter, it means to query the content of the currently set certificate. When there are two parameters, it means that the certificate needs to be set. If the certificate is empty, length needs to be set to 0. The client does not load the certificate and obtains it automatically.

	type: the certificate type of the operation 1: CA root certificate 2: Client public key 3: Client private key length: certificate length. When this parameter is omitted, it means querying the corresponding certificate. When this parameter is added, it means the length of the certificate to be set. A length of 0 means clearing the current certificate.
respo nse	Query Mode +MQTTCRET:<type>,<length>,<certificate content> OK Setting Mode > // Receiving this symbol means you can start writing the certificate OK // OK will be returned after the input length is sufficient
Exam ple	Check certificate AT+MQTTCRET=1 +MQTTCRET:1,1758,-----BEGIN CERTIFICATE----- ..... -----END CERTIFICATE----- OK Setting up certificates AT+MQTTCRET=1,1758 > //> can send data after it appears -----BEGIN CERTIFICATE----- ... -----END CERTIFICATE----- OK //OK will be returned after receiving
Description information in HELP	
respo nse	Query and set MQTT Cret

4.3.6 AT+MQTTDISCONN disconnects the MQTT connection

AT+ MQTTDISCONN	
descr ibe	Disconnect MQTT
respo nse	OK
Exam ple	AT+MQTT=1,192.168.202.10 //Set domain name OK

	#AT+MQTT=2,1883 //Set the port number OK #AT+MQTT=3,1 //Set the connection mode OK #AT+MQTT=4,client_id //Set user ID OK #AT+MQTT=5,admin //Set MQTT username OK #AT+MQTT=6,public //Set the MQTT password OK #AT+MQTT? //Query MQTT connection and configuration +MQTT:0,192.168.202.10,1883,1,client_id,admin,public OK #AT+MQTT //Connect to MQTT OK # +EVENT:MQTT_CONNECT //MQTT connection successful

4.3.7 AT+MQTTPUB publishes MQTT message

AT+MQTTPUB=<topic>,<qos>,<Retained>,<payload>	
describe	Publishing MQTT messages
parameter	topic: the topic to be published qos: qos level (0,1,2) Retained : Whether it is a retained message. 0 indicates a normal message. 1 indicates a retained message. payload: payload message
response	OK
Example	AT+MQTTPUB=testtopic,1, 0, 456 OK
Description information in HELP	
respo	Publish MQTT message

nse	

4.3.8 AT+MQTTPUB RAW publishes an MQTT message of a specified length

AT+MQTTPUB RAW =<topic>,<qos>,<Retained>,<length>	
describe	Publishing MQTT messages
parameter	topic: the topic to be published qos: qos level (0,1,2) Retained : Whether it is a retained message. 0 indicates a normal message. 1 indicates a retained message. length: the length of the data to be sent
response	OK
Example	AT+MQTTPUBRAW=testtopic,1, 0, 10 // Send 10 bytes of data to testtopic > // After receiving this character, start entering the data to be sent OK // When 10 bytes of data are received , the data will be sent (can be any data) , and OK will be displayed when the sending is completed
Description information in HELP	
response	Publish long MQTT message

4.3.9 AT+MQTTSUB Subscribe to MQTT messages

AT+MQTTSUB?	
describe	Query subscribed topics and topic status
response	<status>,<Topic> ... OK //status description status: Subscription status 0: Initialization state 1: Subscribing (first subscription) 2: Subscribing (re-subscribe after disconnection and reconnection) 3: Subscription successful Topic: Subscribed topic
Example	#AT+MQTTSUB=testtopic0,0

	OK #AT+MQTTSUB=testtopic1,1 OK #AT+MQTTSUB? 3,testtopic0 3,testtopic1 OK
AT+MQTTSUB=<topic>,<qos>	
describe	Subscribe to a topic
parameter	topic: the topic to subscribe to qos: qos level (0,1,2)
response	OK
Example	AT+MQTTSUB=testtopic0,0 OK
Description information in HELP	
response	Subscribe to MQTT Topic
Notes	The default maximum number of topics that can be subscribed is 5, and each subscription consumes about 100 bytes of memory.

4.3.10 AT+MQTT UN SUB cancels subscription to MQTT messages

AT+MQTT UN SUB=<topic>	
describe	Unsubscribe from a topic
parameter	topic: the topic to be cancelled
response	OK
Example	AT+MQTTSUB=testtopic0 OK
Description information in HELP	
response	Unsubscribe MQTT Topic

4.4 HTTP Directives

4.4.1 AT+HTTPCLIENTLINE Send HTTP/HTTPS request (single line mode)

AT+HTTPCLIENTLINE=<transport_type>,<opt>,<content-type>,<host>,<port>,<path>[,<data>]	
describe	Make an HTTP request
parameter	transport_type: 1: HTTP 2: HTTPS opt: 2: GET 3: POST content-type: (valid only for POST, not for GET, can be any string, reference type is as follows) application/x-www-form-urlencoded application/json multipart/form-data t ext/xml text/ html host: server domain name or IP (eg: www.baidu.com or 192.168.1.100) port: port number (HTTP default value is 80, HTTPS default value is 443) path: HTTP(S) path, default value is "/" data: data carried in the request When opt is GET, this is carried in the patch, and the format complies with the http format requirements (?key1=value1&key2=value2 ...) When opt is POST, this is the body carried by POST
response	Response length:<len> //response body data length <response> //Get the response data OK //Request successful
Example	http get AT+HTTPCLIENTLINE=1,2,,www.baidu.com,, https get AT+HTTPCLIENTLINE= 2 ,2,,www.baidu.com,, http post AT+HTTPCLIENTLINE=1,3,,192.168.2.253,8080,/ test ,"{\"OTP\":\" test \"}"
Description information in HELP	
respo	Initiate an http or https request

nse	

4.4.2 AT+HTTP RAW sends HTTP/HTTPS request (long data mode)

AT+HTTP RAW =<transport_type>,<opt>,<content-type>,<host>,<port>,<path> , < len >	
describe	Make an HTTP request
parameter	transport_type: 1: HTTP 2: HTTPS opt: 2: GET (not supported yet) 3: POST content-type: (valid only for POST, not for GET, can be any string, reference type is as follows) application/x-www-form-urlencoded application/json multipart/form-data t ext/xml text/ html host: server domain name or IP (eg: www.baidu.com or 192.168.1.100) port: port number (HTTP default value is 80, HTTPS default value is 443) path: HTTP(S) path, default value is "/" Len: The length of the data to be received data: data carried in the request When opt is GET, this is carried in the patch, and the format complies with the http format requirements (?key1=value1&key2=value2 ...) When opt is POST, this is the body carried by POST
response	> // After receiving this character, start entering the data to be sent <response> //Response data OK //Request successful
Example	http post AT+HTTPRAW=1,3,"application/json" , 192.168.1.199,8080 , / test , 5 > hello // Input 5 bytes of data Test ack //Get response OK //Get completed
Description information in HELP	
response	Initiate an http or https request

4.5 SNTP Commands

4.5.1 AT+SNTPTIME queries SNTP time

AT+SNTPTIME	
describe	Same as AT+SNTPTIME ?
AT+SNTPTIME ?	
describe	Query SNTP time Note: SNTP is not enabled by default. You need to connect to the Internet and use AT+SNTPTIMECFG to enable it. When it is not enabled, the local RTC time is queried.
response	+SNTPTIME: <week> <month> <day> <HH> : <mm> : <ss> <yyyy> OK week: Week [Mon,Tue,Wed,Thu,Fri,Sat,Sun] month: month [Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec] day: day HH: hours mm: minutes ss: seconds yyyy: year
Example	AT+SNTPTIMECFG=1,8 // Enable SNTP OK AT+SNTPTIME? //Query time after successful synchronization +SNTPTIME:Wed May 03 10:49:41 2023 OK
Description information in HELP	
response	Query SNTP time
Notes	Supported models Ai-WB2 Series

4.5.2 AT+SNTPTIMECFG queries and sets the SNTP time zone and server

AT+SNTPTIMECFG	
describe	Same as AT+SNTPTIMECFG?
AT+SNTPTIMECFG ?	

describe	Query the SNTP service status
response	+SNTPTIMECFG:<enable>,<timezone> [,<SNTP server1>,<SNTP server2>,<SNTP server3>] OK Enable : Whether the SNTP refresh service is started; 0 is not running; 1 is running timezone : time zone, value range is -12~+14 SNTP server1 /2/3 : SNTP server domain name
Example	AT+SNTPTIMECFG? +SNTPTIMECFG:1,8,"cn.ntp.org.cn","ntp.sjtu.edu.cn","us.pool.ntp.org" OK
AT+SNTPTIMECFG = <enable>,<timezone> [,<SNTP server1>,<SNTP server2>,<SNTP server3>]	
describe	Setting SNTP Configuration
parameter	Enable : SNTP refresh service status setting; 0 to disable; 1 to enable timezone : time zone, value range is -12~+14 SNTP server1 /2/3 : SNTP server domain name, if the default setting is "cn.ntp.org.cn", "ntp.sjtu.edu.cn", "us.pool.ntp.org"
response	OK
Example	AT+SNTPTIMECFG=1,8,cn.ntp.org.cn OK
Description information in HELP	
response	Query and set SNTP config
Notes	Supported models Ai-WB2 Series

4.5.3 AT+SNTPINTV query and set SNTP refresh interval

AT+SNTPINTV	
describe	Same as AT+SNTPINTV ?
AT+SNTPINTV ?	
describe	Query the SNTP service refresh interval
response	+SNTPINTV:<interval second> OK interval second : refresh interval, unit S
Exam	AT+SNTPINTV?

ple	 +SNTPINTV:3600 OK
AT+SNTPINTV = <interval second>	
descr ibe	Set the SNTP service refresh interval
para meter	interval second : refresh interval, unit S, value 15~4294967
respo nse	OK
Exam ple	AT+SNTPINTV=15 OK
Description information in HELP	
respo nse	Query and set SNTP refresh interval
Notes	Supported models Ai-WB2 Series

5. BLE proprietary commands

5.1 Basic instructions

5.1.1 AT+BLEMAC Set and query Bluetooth MAC address

AT+BLEMAC?	
descr ibe	Query Bluetooth MAC address
respo nse	+BLEMAC:<MAC> OK
Exam ple	
AT+BLEMAC=<MAC>	
descr ibe	Set Bluetooth MAC address (effective after restart)
para meter	MAC: The Bluetooth MAC address to be set, in lowercase format without separators, eg: ab5f8d9ebb01
respo	OK

nse	
Example	
Description information in HELP	
response	Query and set BLE MAC

5.1.2 AT+BLEMODE query and set Bluetooth mode

AT+BLEMODE?	
describe	Query working mode
response	+BLEMODE : <mode> OK
Example	
AT+BLEMODE=<mode>	
describe	Set Bluetooth working mode Note: After setting the Bluetooth mode, it will be executed immediately. If you want to start Bluetooth, you need to set the Bluetooth parameters first and then start Bluetooth
parameter	mode: 0: Slave mode 1: Host mode 2: iBeacon mode 9: Bluetooth off
response	OK
Example	
Notice	If Realtek series (BW16/BW15) has multiple wireless types enabled, they need to be enabled in the specified order. If you enable AP+STA+Bluetooth triple mode, or AP+STA mixed mode, you need to turn on AP first, then connect STA and Bluetooth (there is no requirement for the order of Bluetooth and STA, but AP must be turned on first)
Description information in HELP	
response	Query and set BLE mode
Notes	PB series is 0, slave mode The default mode of TB series is 0, slave mode

5.1.3 AT+BLERFPWR Bluetooth settings or query transmission power

AT+BLERFPWR?	
describe	Query Bluetooth transmission power
response	+BLERFPWR: MAX:<max_power> MIN:<min_power> CURRENT:<cur_power> OK //Parameter Description max_power: The maximum Bluetooth transmission power supported by the current module min_power: The minimum Bluetooth transmission power supported by the current module cur_power: Bluetooth transmission power currently set by the module
Example	
AT+BLERFPWR=<power>	
describe	Set the Bluetooth transmission power (need to be set when Bluetooth is turned off)
parameter	power: Bluetooth transmission power, the value is an integer, MAX (maximum transmission power), MIN (minimum transmission power)
response	OK
Example	
Description information in HELP	
response	Query and set BLE RF power
Notes	The default current transmit power of the PB series is the maximum transmit power of 10 The default current transmit power of the TB series is the maximum transmit power of 10

5.1.4 AT+BLESTATE to query the connection status

AT+BLESTATE?	
describe	Query Bluetooth connection status
response	+ BLESTATE:< status > OK
parameter	status: 0: Not connected 1: Connected

Example	
Description information in HELP	
response	Query BLE connection status

5.1.5 AT+BLEDISCON disconnects Bluetooth connection

AT+BLEDISCON	
describe	Disconnect Bluetooth
response	OK
Example	
Description information in HELP	
response	Disconnect BLE

5.1.6 AT+BLEMTU query or set MTU

AT+BLEMTU?	
describe	Query Bluetooth MTU
response	+BLEMTU: <MTU> OK
Example	
AT+BLEMTU=<mtu>	
describe	Setting Bluetooth MTU
parameter	mtu: Set the Bluetooth MTU, the value range is 23~250
response	OK
Example	
Description information in HELP	
response	Query and set BLE MTU
Notes	The default MTU of the P B series is 23 MTU of TB series is 247

5.1.7 AT+BLESEND sends data to the Bluetooth transparent channel

AT+BLESEND=<len>,<data>	
describe	Send data to the Bluetooth transparent UUID channel
parameter	len: the length of the data to be sent, in bytes data: data content to be sent, the length should be consistent with len
response	OK
Example	
Description information in HELP	
response	Send by BLE transparent transmission

5.1.8 AT+BLESEND RAW sends data to the Bluetooth transparent channel (supports hex data)

AT+BLESEND RAW =<len>	
describe	Send data to the Bluetooth transparent UUID channel
parameter	len: the length of the data to be sent, in bytes
response	> // After receiving this character, start entering the data to be sent OK // When the specified byte data is received , the data will be sent (it can be any data) , and OK will be displayed when the sending is completed
Example	
Description information in HELP	
response	Send by BLE transparent transmission

5.1.9 AT+BLESERUUID query or set service UUID

AT+BLESERUUID?	
descr	Query the UUID of the Bluetooth transparent transmission service

ibe	
respo nse	+BLESERUUID: <UUID> OK
Exam ple	
AT+BLESERUUID=<UUID>	
descr ibe	Set the Bluetooth transparent transmission service UUID (Bluetooth name can only be set when Bluetooth is turned off)
para meter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode) String length 32 bits eg:00112233445566778899aabbccddeeff 16- bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set BLE TT server UUID
Notes	Default primary service UID:55535343fe7d4ae58fa99fafd205e455 Mode support BW16: 128-bit mode WB2 Series 16/128 bit mode

5.1.10 AT+BLETXUUID query or set Bluetooth TX UUID

AT+BLETXUUID?	
descr ibe	Query the UUID of the Bluetooth transparent transmission service TX characteristic
respo nse	+BLETXUUID: <UUID> OK
Exam ple	
AT+BLETXUUID=<UUID>	
descr ibe	Set the Bluetooth transparent transmission service TX characteristic UUID (Bluetooth name can only be set when Bluetooth is turned off)
para meter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode)

	String length 32 bits eg:00112233445566778899aabbccddeeff 16- bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set BLE TX UUID
Notes	Default TX UUID:49535343884143f4a8d4ecbe34729bb3 The Bluetooth service attribute corresponding to TX is NOTIFY Mode support BW16: 128-bit mode WB2 Series 16/128 bit mode

5.1.11 AT+BLERXUUID query or set Bluetooth RX UUID

AT+BLERXUUID?	
descr ibe	Query the RX characteristic UUID of the Bluetooth transparent transmission service
respo nse	+ BLERXUUID : <UUID> OK
Exam ple	
AT+BLERXUUID=<UUID>	
descr ibe	Set the Bluetooth transparent transmission service RX characteristic UUID (Bluetooth name can only be set when Bluetooth is turned off)
para meter	UUID: supports two modes: 16-bit and 128-bit mode 128-bit mode (the default is 128-bit mode) String length 32 bits eg:00112233445566778899aabbccddeeff 16- bit mode When the 128-bit UUI is 0000XXXX00001000800000805F9B34FB, bits 17 to 32 will be set to the 16-bit UUID. Eg: 0000FFF100001000800000805F9B34FB means the 16-bit UUID is set to 0XFFF1
respo nse	OK
Exam ple	

Description information in HELP	
respo nse	Query and set BLE RX UUID
Notes	Default RX UUID:495353431e4d4bd9ba6123c647249616 The Bluetooth attribute corresponding to RX is WRITE Mode support BW16: 128-bit mode WB2 Series 16/128 bit mode

5.1.12 AT+TRANSENTER enters Bluetooth transparent transmission mode

AT+TRANSENTER	
describe	Enter Bluetooth transparent mode
response	OK
Remark	Enter +++ to exit the transparent transmission mode and enter the AT command mode
Example	
AT+TRANSENTER =<autoEntry>,<saveFlash>	
describe	Configuring automatic connection configuration
parameter	autoEntry: whether to automatically enter transparent transmission mode after connecting 0: Do not automatically enter transparent mode after Bluetooth connection 1: Automatically enter transparent transmission mode after Bluetooth connection saveFlash: Whether to save the configuration to flash 0: Do not save to flash 1: Save to flash
response	OK

5.2 Slave Instructions

5.2.1 +DATA Receive Bluetooth transparent data in host mode

+DATA : <len>,<data>	
descr ibe	In host mode, data sent from the Bluetooth transparent UUID channel is received

para meter	len: length of received data, in bytes data: received data content, the length should be consistent with len
Rema rk	This command is only valid in AT mode. In transparent transmission mode, the original data will be received directly.
Exam ple	

5.2.2 AT+ BLENAME sets the Bluetooth device name

AT+BLENAME?	
descr ibe	Query Bluetooth name
respo nse	+BLENAME : <ble name > OK
Exam ple	
AT+BLENAME=< ble name >	
descr ibe	Set the Bluetooth device name (Bluetooth name can only be set when Bluetooth is turned off) Default name "ai-thinker"
para meter	ble name: Bluetooth name (UTF-8 format, supports Chinese)
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set BLE name
Notes	Default Bluetooth name: ai-thinker

5.2.3 AT+BLECONINTV query or set the Bluetooth connection interval

AT+BLECONINTV?	
descr ibe	Query Bluetooth connection interval
respo nse	+BLECONINTV: <min_interval>,< max_interval>,<latency>,< timeout> OK
Exam	

ple	
AT+BLECONINTV=<min_interval>,< max_interval>,<latency>,< timeout>	
descr ibe	Set the Bluetooth connection interval (only allowed when Bluetooth is turned off)
para meter	min_interval: minimum connection interval , ranging from 6 to 3200 (the actual time is minInterval*1.25ms, and the requirement is 7.5ms to 4s) max_interval: Maximum connection interval , ranging from 6 to 3200 (the actual time is minInterval*1.25ms, required to be between 7.5ms and 4s) Latency: delay (how many times the connection can be skipped), required to be between 0 and 499 Timeout: timeout , the value range is 10~3200, the actual time is Timeout *10ms, that is, 100ms~32*1000ms and Timeout *10>(1+ Latency)* max_interval *1.25
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set BLE connect interval
Notes	P B series default parameters: +BLECONINTV:6,12,0,200 TB series default parameters: +BLECONINTV: 8 , 8 , 99 , 4 00

5.2.4 AT+BLEAUTH query or set Bluetooth pairing code

AT+BLEAUTH?	
descr ibe	Query Bluetooth pairing code
respo nse	+BLEAUTH: <pind> OK
Exam ple	
AT+BLEAUTH=<pind>	
descr ibe	Set Bluetooth pairing code (can only be set when Bluetooth is turned off)
para meter	pind: Enable pairing code, set 6 digits eg: 123456 Disable pairing codeDISENABLE
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Query and set BLE PIN code

Notes	Not enabled by default

5.2.5 AT+BLEADVINTV Query or set the Bluetooth broadcast interval

AT+BLEADVINTV?	
describe	Query Bluetooth broadcast interval
response	+BLEADVINTV: <intv> OK
Example	
AT+BLEADVINTV=<intv>	
describe	Set the Bluetooth broadcast interval (only allowed when Bluetooth is turned off)
parameter	<intv>: broadcast interval, the unit value is 160~16384, the broadcast interval is iNtv*0.625ms
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast time
Notes	P B default parameter 320 TB default parameter 800

5.2.6 AT+BLEADVDATA queries or sets Bluetooth broadcast data

AT+BLEADVDATA?	
describe	Query the currently set Bluetooth broadcast data The default broadcast data is 8 bytes, the first 6 bytes are the Bluetooth MAC address + the first two bytes of the transparent service UUID
response	+BLEADVDATA: <data> OK
Example	

AT+BLEADVDATA=<data>	
describe	Set the Bluetooth broadcast data content (only allowed to perform settings when Bluetooth is turned off)
parameter	data: Bluetooth data set (This is hex data in string form, with a maximum length of 32 bytes, eg: 00112233445566778899aabbccddeeff)
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast data
Notes	Default parameters: MAC+55e4 (the first four digits of the primary service uuid), for example: 40154641871855e4

5.2.7 AT+BLEADVEN Bluetooth settings or query broadcast enable

AT+BLEADVEN?	
describe	Check whether Bluetooth broadcast is enabled
response	+BLEADVEN: <status> O K
Example	
AT+BLEADVEN=<status>	
describe	Start and stop Bluetooth broadcast (settings can only be performed in Bluetooth slave state)
parameter	status: 0 closed, 1 open
response	OK
Example	
Description information in HELP	
response	Query and set BLE broadcast status
Notes	Enabled by default

5.3 Host Commands

5.3.1 AT+BLESCAN initiates a scan in Bluetooth host mode

AT+BLESCAN	
describe	Initiate scanning in Bluetooth host mode
response	OK //Note that this OK only means that the command was sent successfully, and the scan is not actually completed. Devices Found:id/total //index/total indicates the serial number of the currently scanned Bluetooth device and the total number of scanned devices name:<name> //Bluetooth name, if not available, displays N/A MAC:<MAC> //lowercase without colon rssi:<rssi> Devices Found:<id/total> name:<name>N/A MAC:<MAC> rssi:<rssi> .....
Example	
Description information in HELP	
response	Start BLE scan
Notes	The default scan time of the P B series is 5 seconds, the scan interval is 230*0.625 mSec, and the scan window is 160* 0.625 mSec. The default scanning time of TB series is 2 seconds, the scanning interval is 160 * 0.625 mSec, and the scanning window is 160 * 0.625 mSec.

5.3.2 AT+BLECONNECT The host initiates a connection

AT+BLECONNECT= <MAC>	
describe	Connect to the specified Bluetooth (connection is only allowed in Bluetooth host state) Note: This is only a single connection. It will not automatically reconnect after a connection failure, and it will not automatically reconnect after a successful connection.
parameter	MAC: connection target mac address (eg: A4C13812505C)
response	Connecting... ... OK
Exam	

ple	
Description information in HELP	
respo nse	Set BLE connect

5.3.3 AT+BLEAUTOCON Set the host to automatically connect to the slave parameters

AT+BLEAUTOCON=< MAC>,<UUID>,<save_flash>	
descr ibe	Connect to the specified Bluetooth (connection is only allowed in Bluetooth host state)
para meter	MAC: connection target mac address (eg: A4C13812505C) UUID: If you need to connect to a specific UUID, set it to the last two digits of the target UUID (eg: E455) Note: Either MAC or UUID can be used to connect (you can also set both). If there is no restriction, set it to FALSE. If both MAC and UUID are set to FALSE, automatic connection will be disabled. save_flash: whether to save to flash and set automatic connection at startup, 0 means not to save and only connect this time, 1 means to save to flash and automatically connect next time you start
respo nse	+EVENT:BLE_CONNECTED //If the connection is successful, this message will be displayed +BLEAUTOCON:Wait connect //If the specified Bluetooth is not currently scanned, this message will be displayed (the background will automatically scan and automatically connect when the specified connection is scanned) OK
Exam ple	AT+BLEMODE=1 OK AT+BLEAUTOCON= 112233445566 ,FALSE,1 OK
Description information in HELP	
respo nse	Set BLE auto connect
Notes	After the first successful connection, it will continue to actively connect

5.3.4 AT+BLEDISAUTOCON cancels automatic scanning connection

AT+BLEDISAUTOCON

describe	Cancel automatic scanning to connect Bluetooth
response	OK
Example	
Description information in HELP	
response	Turn off BLE auto connect

5.4 BLE iBeacon Commands

5.4.1 AT+ BLE IBCNUUID Query or set Bluetooth iBeacon UUID

AT+BLEIBCNUUID?	
describe	Query the iBeacon UUID of the current Bluetooth setting
response	+BLEIBCNIIUD: <iBeacon> OK
Example	
AT+BLEIBCNUUID=<iBeacon>	
describe	Set the Bluetooth iBeacon UUID (only allowed when Bluetooth is turned off)
parameter	iBeacon: UUID to set (16 bytes in length, 32 bits in string length eg: 00112233445566778899aabbccddeeff)
response	OK
Example	
Description information in HELP	
response	Query and set BLE iBeacon UUID

5.4.2 AT+ BLEIBCNDATA sets Bluetooth iBeacon data

AT+ BLEIBCNDATA?	
descr	Query Ibeacon data

ibe	
respo nse	+BLEIBCNDATA:<companyID>,<major>,<minor>,<power> //The data is in the form of hexadecimal string OK
Exam ple	AT+BLEIBCNDATA? +BLEIBCNDATA:4c00,2774,6b74,c5 OK
AT+ BLEIBCNDATA =<company ID>,<MAJOR>,<MINOR>,<POWER>	
descr ibe	Set Bluetooth iBeacon data (only allowed when Bluetooth is turned off)
para meter	companyID (2-byte hexadecimal data, eg: 11aa) MAJOR (2 bytes of hexadecimal data, eg: 11aa), MINOR (2 bytes of hexadecimal data, eg: 11aa), POWER (1 byte hexadecimal data, eg: aa)
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Set BLE iBeacon data

5.5 BLE MESH Commands

5.5.1 SIG-MESH instructions

5.5.1.1 AT+PROVISION Bluetooth settings start the network configuration function

AT+PROVISION	
descr ibe	Bluetooth settings start the network configuration function
Rema rk	When the node is in the unProvisioning state, that is, it has not been provisioned, no broadcast is sent, and the gateway cannot scan this device and connect. If you need to connect, you need to use the AT+PROVISION command to enable the node so that the device can be scanned and connected. When the device is in the Provisioning state, that is, it has been provisioned with the gateway, there is no need to enable the node, and the node automatically connects to the mesh network that has been provisioned.
respo	OK

nse	
Example	
Description information in HELP	
response	Start provision

5.5.1.2 AT+MESHSEND SIG-MESH sends data

AT+MESHSEND=<addr>,<opcode>,<data>	
describe	SIG-MESH sends data
parameter	addr: the address of the target opcode: Operation code The current opcodes for esp32 gateway are as follows 1: set instruction, operation code opcode is D18888 2: get instruction, operation code opcode is D08888 3: ACK instruction, operation code opcode is D38888 4: Delete node instruction opcode is D28888 data: data example: {"mesh_data vendor" : { "daddr" : 3 , "saddr" : 2 , "opcode" : d38888 , "data_len" : 2 , "data" : 0101 (hex string) ret : 1 }}
response	OK
Example	
Description information in HELP	
response	SIG-MESH send data

5.5.1.3 AT+MESHADDR query node address

AT+MESHADDR	
describe	Query node address
response	+MESHADDR:<addr> OK
Example	
Description information in HELP	
response	Query SIG-MESH addr

5.5.1.4 AT+MESHSTATE to check whether the network configuration is successful

AT+MESHSTATE	
describe	Check whether the network configuration is successful
response	+MESHSTATE:<status> //0: failed; 1: successful OK
Example	
Description information in HELP	
response	Query Mesh status

5.5.2 ALI-MESH Commands

5.5.2.1 aliGenie_data Tmall Genie sends data

aliGenie_data	
describe	Tmall Genie sends data
Format	{ "aliGenie_data" : { "daddr" : %x , "saddr" : %x , "opcode" : %x , "data_len" : %d , "data" : %s }} // The data format is json string d addr : destination address saddr : source address opcode : Operation code data_len : data length data ： data content
Example	

5.5.2.2 AT+AliGenie sets the Tmall Genie triplet

AT + AliGenie = <pid> , <mac> , <secret>	
describe	Set Tmall Genie triplet
para	pid : triplet product ID (8 digits)

meter	mac : triplet physical address (12 bits) secret : triplet key (32 bits) Note: All are hexadecimal strings.
respo nse	OK
Exam ple	
Description information in HELP	
respo nse	Set Ali key

5.5.2.3 AT+SEND2ALI reports data

AT+SEND2ALI=<opcode>,<param>	
descr ibe	Report data to the Tmall Genie platform
para meter	o pcode : operation code, length 6 bits/4 bits param : reporting parameter, maximum length is 20 characters
respo nse	OK
Exam ple	AT+SEND2ALI=8204,01 reporting status is open
Description information in HELP	
respo nse	Send data to Ali

6. Production test instructions

6.1 Standard instructions

6.1.1 ##boot development board button trigger signal

\r\n##boot\r\n	
descr ibe	When the development board test is enabled, if the key is triggered, this data will be printed on the serial port
Exam ple	

6.1.2 AT+NodeMCUTEST development board test enable

AT+NodeMCUTEST=<start>	
describe	Enable the development board test function
parameter	start: 0: Off 1: On
response	OK
Example	
Description information in HELP	
response	Set development board test function

6.1.3 AT+LEDTEST development board LED test command

AT+LEDTEST=<start> [,<ledLev>,<ledNum>,<ledPin1>,…,<ledPinN>]	
describe	Development board LED test instructions
parameter	start: 0: Turn off the marquee 1: Start the marquee (red, green, blue, yellow, and white switch, each light for 1000ms) l edLev : LED effective level (supported by some modules) 0 : Low level lights up 1: High level lights up ledNum : (supported by some modules) How many LEDs are there in total ? ledPinX : (supported by some modules) PIO number corresponding to the LED , multiple pins are separated by commas
response	OK
Example	
Description information in HELP	
response	Start test board LED test

7. appendix

7.1 Appendix 1 IOMap table of each model module

Ai-M61-01-BLO

AT+SYSIOMAP=48,NC,0,1,NC,3,NC,NC,NC,NC,NC,NC,NC,NC,10,11,12,NC,13,14,15,NC,NC,18,19,NC,NC,NC,NC,NC,NC,NC,NC,20,21,22,23,24,25,26,NC,27,28,29,30,31,32,33,34,NC

Ai-M61-32S-BLIAll

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,4,5,6,7,8,9,NC,NC,23,NC,24,28,26,25,27,29,30,31,NC,NC,32,33,NC

Ai-M61-32S-BLO
Ai-M61-32SU-BLO

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,NC,NC,NC,NC,NC,NC,NC,NC,23,NC,24,28,26,25,27,29,30,31,NC,NC,32,33,NC

Ai-M61-32S-BLOOD
Ai-M61-32SU-BLOOD

AT+SYSIOMAP=40,NC,NC,NC,0,1,16,17,12,14,15,18,19,10,13,11,NC,20,NC,NC,NC,NC,NC,NC,NC,NC,NC,24,28,26,25,27,29,30,31,NC,NC,32,33,NC

Ai-M62-12F-BLI

AT+SYSIOMAP=22,NC,20,NC,17,29,0,1,NC,15,14,11,12,NC,NC,NC,28,3,NC,30,27,NC,NC

Ai-M62-12F-BLIJ

AT+SYSIOMAP=22,NC,20,NC,17,10,0,1,NC,15,14,11,12,NC,NC,NC,13,3,NC,30,27,NC,NC

Ai-M62-13-BLI

AT+SYSIOMAP=18,NC,NC,1,30,0,28,17,NC,NC,29,NC,NC,NC,27,NC,3,20,NC

Ai-M62-32S-BLI

AT+SYSIOMAP=38,NC,NC,NC,NC,3,11,12,1,30,0,13,14,15,16,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,10,28,17,NC,27,29,NC,NC,NC,NC,20,NC,NC

Ai-M62-M01L-BLI

AT+SYSIOMAP=33,0,3,20,12,NC,13,14,NC,15,10,2,11,17,16,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,1,30,NC,27,NC,NC,29,28

Ai-M62-M2-I-BLI

AT+SYSIOMAP=31,16,17,11,NC,12,13,14,15,NC,NC,NC,NC,20,NC,NC,NC,27,28,29,30,NC,NC,NC,NC,NC,0,1,3,10,NC,NC

Ai-WB2-01F-BLI

AT+SYSIOMAP=18,NC,NC,11,NC,12,14,3,17,20,22,NC,5,1,NC,NC,NC,NC,NC

Ai-WB2-01M-BLI

AT+SYSIOMAP=18,NC,NC,NC,NC,20,12,14,NC,NC,4,3,2,22,21,17,11,1,0

Ai-WB2-01M-BLIA

AT+SYSIOMAP=18,NC,NC,NC,NC,20,12,14,8,NC,4,3,2,22,21,17,11,1,0

Ai-WB2-01N-BLI

AT+SYSIOMAP=14,NC,3,NC,20,NC,4,NC,14,21,NC,22,8,1,2

Ai-WB2-01S-BLI

AT+SYSIOMAP=8,NC,4,NC,NC,NC,NC,NC,NC

Ai-WB2-01S-BLIA

AT+SYSIOMAP=8,NC,4,8,NC,NC,NC,NC,NC

Ai-WB2-01S-BLO

AT+SYSIOMAP=8,NC,4,NC,NC,NC,NC,NC,NC

Ai-WB2-01S-BLOA

AT+SYSIOMAP=8,NC,4,8,NC,NC,NC,NC,NC

Ai-WB2-05W-BLI

AT+SYSIOMAP=22,NC,NC,NC,8,11,16,7,14,NC,17,20,21,22,NC,0,1,2,3,4,5,12,NC

Ai-WB2-05W-BLIA

AT+SYSIOMAP=22,NC,NC,NC,NC,11,16,7,14,NC,17,20,21,22,NC,0,1,2,3,4,5,12,NC

Ai-WB2-12F-BLI

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,22,0,NC,NC,20,21,NC,4,2,NC,5,1,NC,NC

Ai-WB2-12F-BLIA

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,22,0,NC,NC,20,21,NC,4,2,8,5,1,NC,NC

Ai-WB2-12F-BLO

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,5,NC,NC,N
C

Ai-WB2-12F-BLOA

AT+SYSIOMAP=22,NC,11,NC,12,14,17,3,NC,NC,NC,NC,NC,NC,NC,NC,4,NC,8,5,NC,NC,NC

Ai-WB2-07S-BLI
Ai-WB2-12S-BLI
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,2,NC,5,1,NC,NC

Ai-WB2-07S-BLIA
Ai-WB2-12S-BLIA
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,2,8,5,1,NC,NC

Ai-WB2-07S-BLO
Ai-WB2-12S-BLO
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,NC,NC,5,NC,NC,NC

Ai-WB2-07S-BLOA
Ai-WB2-12S-BLOA
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,4,NC,8,5,NC,NC,NC

Ai-WB2-12S-BLIA-J
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,8,4,NC,5,1,NC,NC

Ai-WB2-12S-BLI-J
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,NC,4,NC,5,1,NC,NC

Ai-WB2-12S-BLOA-J
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,8,4,NC,5,NC,NC,NC

Ai-WB2-12S-BLO-J
AT+SYSIOMAP=16,NC,11,NC,12,14,17,3,NC,NC,NC,4,NC,5,NC,NC,NC

Ai-WB2-13-BLI
Ai-WB2-13U-BLI
AT+SYSIOMAP=18,NC,NC,14,17,3,4,2,NC,NC,5,NC,NC,NC,1,NC,11,12,NC

Ai-WB2-13-BLIA
Ai-WB2-13U-BLIA
AT+SYSIOMAP=18,NC,NC,14,17,3,4,2,8,NC,5,NC,NC,NC,1,NC,11,12,NC

Ai-WB2-13-BLO
Ai-WB2-13U-BLO
AT+SYSIOMAP=18,NC,NC,14,17,3,4,NC,NC,NC,5,NC,NC,NC,NC,NC,11,12,NC

Ai-WB2-13-BLOA
Ai-WB2-13U-BLOA
AT+SYSIOMAP=18,NC,NC,14,17,3,4,NC,8,NC,5,NC,NC,NC,NC,NC,11,12,NC

Ai-WB2-32S-BLI

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,20,22,0,21,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,4,2,NC,1,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-32S-BLIA

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,20,22,0,21,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,8,NC,4,2,NC,1,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-32S-BLO

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,NC,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-32S-BLOA

AT+SYSIOMAP=38,NC,NC,NC,NC,11,NC,NC,14,17,3,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,8,NC,4,NC,NC,NC,5,NC,NC,NC,NC,12,NC,NC

Ai-WB2-M1-BLI

Ai-WB2-M1-I-BLI

AT+SYSIOMAP=31,NC,NC,NC,NC,4,14,NC,NC,NC,NC,NC,2,11,NC,NC,12,NC,17,3,22,21,20,NC,0,NC,1,5,NC,NC,NC,NC

Ai-WB2-M1-BLIA

Ai-WB2-M1-I-BLIA

AT+SYSIOMAP=31,NC,NC,NC,NC,4,14,NC,NC,NC,NC,NC,2,11,NC,NC,12,NC,17,3,22,21,20,8,0,NC,1,5,NC,NC,NC,NC

PWM-A01-1-BLO

AT+SYSIOMAP=38,NC,NC,NC,NC,NC,NC,NC,NC,17,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,NC,4,NC,NC,NC,NC,NC,NC,NC,12,NC,NC

BW15

AT+SYSIOMAP=16,17,18,NC,2,15,4,19,NC,NC,20,16,0,3,1,NC,NC

BW16

AT+SYSIOMAP=16,21,34,NC,23,NC,26,29,NC,NC,30,NC,22,27,20,NC,NC