Gizwits Platform Standard Protocol

MCU and WiFi Module

(v4.0.5)

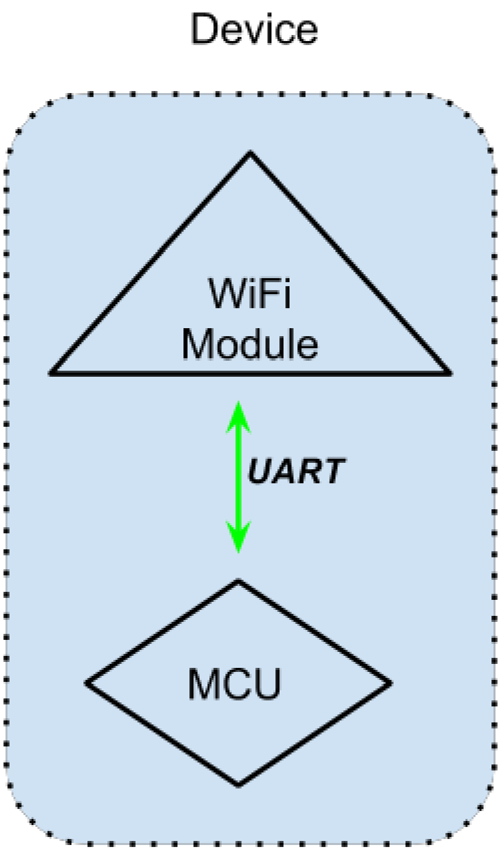
Revision History

Version	Content Modification	By	Date
4.0.0	v4 protocol	Johnson	11/20/2014
4.0.1	“WiFi Module Working Status” - Add “If there is App online” flag (p9)	Johnson	11/29/2014
4.0.2	Specify what the OnBoarding mode is(SoftAP/Web/AirLink) by the WiFi Module Working Status bits(p8)	Johnson	12/09/2014
4.0.3	Update the definition of WiFi Module Working Status bits6~bit11(p9)	Johnson	12/15/2014
4.0.4	1. Module Working Status: Add Manufacture Testing Mode flag (p9) 2. Add the MCU request WiFi Module enter Manufacture Test mode (p11)	Johnson	12/26/2014
4.0.5	Add “Attributes” field to the “Query Device Information response“(p4)	Johnson	02/15/2015

Table of Content

1. Communication Model

Inside the device, the MCU communicates with WiFi module through UART.



Serial connection parameters:

- Baud rate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Hardware flow control: None
- The power for WiFi module, Voltage: 3.3v, Electricity(max): 150mA

2. Convention

2.1. Reading Instructions

- **Len**: Length, indicates the field value length. 1 byte or 2 bytes. If is 2 bytes, endianness is big-endian.
- **Message Pattern**: Message is consist of the following fields - Fixed Header(2B) = 0xFFFF, Remaining Len(2B), Command(1B), SN(1B), Flags(2B), Payload, Checksum(1B). The Remaining Len is the count of bytes from Command to Checksum (includes Command and Checksum). Because the header is fixed to 0xFFFF, so if the sender needs to send 0xFF in the message, it needs to insert a

0x55 after each 0xFF. For the receiver, if found the message content contains 0xFF, should remove the 0x55 right after it.

- **Checksum**: Sum the bytes between Remaining Len and Payload (includes Remaining Len and Payload), then divide it by 256 and get the remainder, in other words, Checksum = sum(Remaining Len...Payload)%256.
- **SN**: Is increased by the sender, from 1 to 255. Reset to 1 after 255. The corresponding response message will carry the acknowledged message SN.

2.2. Message Resending Policy

Except for the "Invalid Message Notification" messages, all other messages should have a response from the receiver. If the sender did not get the response within 200 milliseconds, it should resend the message. The max times of resending is 3.

3. Protocol

3.1. Query Device Information

After reboot, WiFi module needs to query device information.

WiFi module query device information. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x01
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Checksum	1	

MCU replies the query. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x02
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000

6	General Protocol Ver	8	String, "00000004"
7	Business Protocol Ver	8	String, "00000002"
8	Hardware Ver	8	String
9	Software Ver	8	String
10	Product Key	32	String
11	Bindable Timeout	2	The timeout value for bindable state, in seconds, big-endian. If the value is 0, device is always bindable. If the value is a positive integer, indicates that after which seconds the device will become unbindable.
12	Attributes	8	Device Attributes, from right to left we say it is bit0~bit63. bit0 indicates it is ControlCenter device or not. bit0=0 means it is a normal device. bit0=1 indicates it is a ControlCenter device. bit1~bit63 are reserved.
13	Checksum	1	

3.2. WiFi Module Sends Business Message to MCU

Business message means the commands that are specified to the device specification. For example, turn the device on or off, set the temperature, or read the device current status.

WiFi module sends business message to MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x03
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Business Msg	max 65530	Business message that send to MCU.
7	Checksum	1	

MCU acknowledges WiFi module. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x04
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Business Msg	max 65530	Business message the would transparently transmit to Apps or cloud.
7	Checksum	1	

3.3. MCU Sends Business Message to WiFi Module

Business message means the commands that are specified to the device specification. For example, device report the current status.

MCU sends business message to WiFi module. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x05
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Business Msg	max 65530	Business message the would transparently transmit to Apps or cloud.
7	Checksum	1	

WiFi module acknowledges MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x06

4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Business Msg	max 65530	Business message that send to MCU.
7	Checksum	1	

3.4. Heartbeat

If WiFi module did not receive any data from MCU in 55 seconds, it should send heartbeat request to MCU. MCU replies heartbeat response. After 3 times WiFi module did not get heartbeat response from MCU, WiFi module could think the UART connection is not working properly and should reboot itself. If MCU did not receive heartbeat request from WiFi module within 180 seconds, it should reboot WiFi module through the hardware pin.

WiFi module sends heartbeat request to MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x07
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Checksum	1	

MCU replies heartbeat response. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x08
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	

3.5. Tell WiFi Module Enter Configurable Mode

MCU could let WiFi module enter configurable mode. Configurable mode is, if WiFi is not connected with WiFi router, the SoftAP or AirLink onboarding mode, if not, bindable mode.

MCU tell WiFi module enter configurable mode. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x09
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Onboarding Method	1	1 is SoftAP or Web, 2 is AirLink
7	Checksum	1	

WiFi module acknowledges MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0A
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	

3.6. Reset WiFi Module

After WiFi module receives the reset request, it should clear the saved WiFi SSID and password, DID and Passcode.

MCU reset WiFi module. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF

2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0B
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Checksum	1	

WiFi acknowledges MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0C
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	

3.7. WiFi Module Notify MCU Its Working Status

WiFi module will send working status in interval(every 10 minutes) or after working status changed, to MCU.

WiFi module notify MCU its working status. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0D
4	SN	1	Serial Number
5	Flags	2	0x0000
6	WiFi Working Status bit8~bit15	1	The order of bit8 ~ bit15 is from low bit to high bit. For the function definition please refer to the next field.

7	WiFi Working Status bit0~bit7	1	The order of bit0 ~ bit7 is from low bit to high bit. The bit0 ~ bit15 function definition is described as below: ● bit0: If SoftAP mode is turned on, 0 is off, 1 is on ● bit1: If Station mode is turned on, 0 is off, 1 is on ● bit2: If OnBoarding mode is turned on, 0 is off, 1 is on. If SoftAP mode is turn on(bit0 is1), then the OnBoarding mode is SoftAP or Web; If SoftAP mode is turn off(bit0 is 0), then the OnBoarding mode is AirLink ● bit3: If Bindable mode is turned on, 0 is off, 1 is on ● bit4: If is connected to WiFi router, 0 is not connected, 1 is connected ● bit5: If is connected to M2M server, 0 is not connected, 1 is connected ● bit6~bit7: reserved ● bit8~bit10: Only is meaningful if bit4 is set to 1. This 3-bits integer indicates the WiFi signal strength(RSSI) of the connected WiFi router. Range is from 0 to 7, 0 is low and 7 is high ● bit11: If there is App online. 0 is there is not, 1 is there is ● bit12: If is in Manufacture Testing mode, 0 is no, 1 is yes ● bit13~bit15: reserved
8	Checksum	1	

MCU acknowledges WiFi module. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0E
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	

3.8. Reboot MCU

WiFi module requests MCU to reboot . WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description

1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x0F
4	SN	1	Serial Number
5	Flags	2	0x0000
6	Checksum	1	

MCU acknowledges WiFi module. MCU ⇒ WiFi module. To prevent WiFi module did not receive the acknowledgement and resend the reboot request and cause the MCU reboot again, MCU must wait 600 milliseconds before reboot itself.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x10
4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	

3.9. Invalid Message Acknowledgement

WiFi module acknowledges MCU that the message with the same SN that was sent from MCU to WiFi module is invalid. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x11
4	SN	1	Then message SN that was invalid
5	Flags	2	0x0000
6	Error Code	1	1 is checksum error, 2 is comand unidentified, 3 is other error, 4~255 is reserved.

7	Checksum	1	

MCU acknowledges WiFi module that the message with the same SN that was sent from WiFi module to MCU is invalid. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x12
4	SN	1	Then message SN that was invalid
5	Flags	2	0x0000
6	Error Code	1	1 is checksum error, 2 is comand unidentified, 3 is other error, 4~255 is reserved.
7	Checksum	1	

3.10. MCU Requests WiFi Module Enter Manufacture Testing Mode

MCU requests WiFi module enter Manufacture Testing mode. MCU ⇒ WiFi module.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x13
4	SN	1	
5	Flags	2	0x0000
6	Checksum	1	

WiFi module acknowledges MCU. WiFi module ⇒ MCU.

Order	Field Name	Byte Len(B)	Description
1	Fixed Header	2	0xFFFF
2	Remaining Len	2	len(Command...Checksum)
3	Command	1	0x14

4	SN	1	The acknowledged message SN
5	Flags	2	0x0000
6	Checksum	1	