DWIN WIFI Module Protocol User Guide
V1.2.3

Change Log

Version number	State of change	Description of modification point	Author	Date
V 1.0	C	Realize basic wifi module protocol function	Wang Jintai	2019-12-15
V1.1	A	Add scanning hotspot function	Wang Jintai	2019-12-30
V1.2.1	A	1. Add UDP broadcast protocol 2. Added instructions for using UDP broadcast protocol, please refer to the instructions for 5.6	Li Jianmin	2020-4-15
V1.2.2	A	1. Increase write-back to IP 2. Increase the configuration of the port	Wang Jintai	2020-4-20
V1.2.3	A	Modify 487 address description	Li Jianmin	2020-6-4

*Change status: C-create, A-add, M-modify, D-delete
Description of modification points: A brief explanation of the change status, such as adding a certain function, modifying a certain module and other information. The words "modified according to review opinions" are not allowed

1. Overview

In order to make DWIN smart LCD Module easy and convenient to connect to the Internet, DWIN set up its own cloud server and integrated the interface to connect to the Internet on the DGUS system, so that it will be very simple and convenient to develop DWIN smart LCD Module with network function in the future .

Currently supported LCD Module platforms are T5UID1, T5UID2 and T5L_ASIC. Supported products are 86 box series products and network screens, etc.

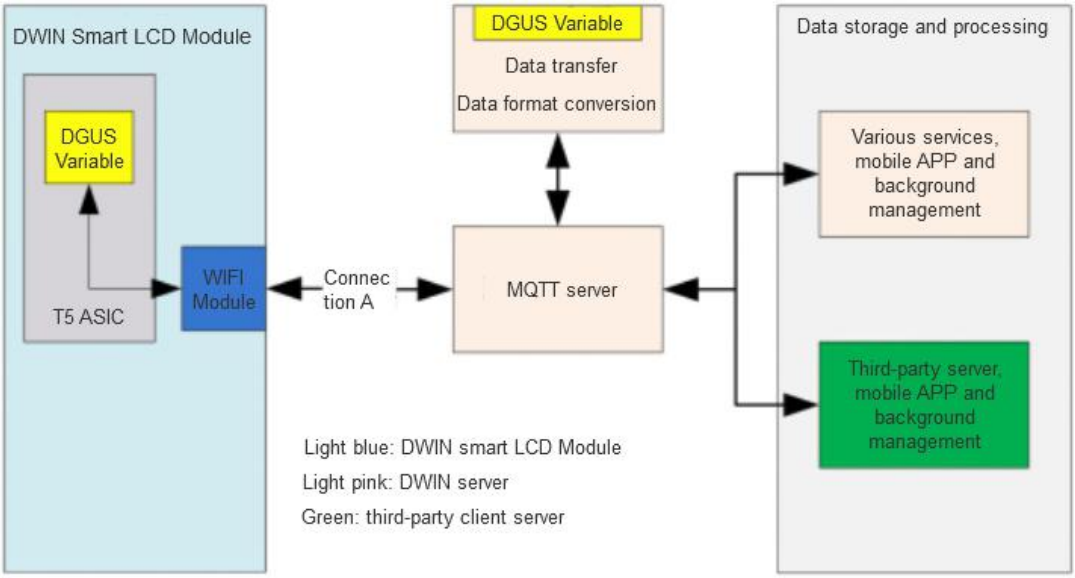
The advantages of the DWIN WIFI solution are mainly reflected in the following three aspects:

1. Development efficiency
Based on the DGUS architecture, after the stand-alone function is realized, the Single Chip Microcomputer zero code can realize network configuration and data upload. The engineer only needs to plan the data address. The complex JSON protocol parsing is processed in the cloud to save the resources of the Single Chip Microcomputer and improve the development efficiency. Customers can focus on the core functions of the product.

2. Stability
The solution has opened the protocol between the main chip (GUI), WIFI module, and MQTT server to form a UI+IOT integrated solution, reducing the number of customer development links, reducing communication costs, and reducing the uncertainty in development, so that the entire solution Stability is improved.

3. Cost
As a part of DWIN's IoT solution, WIFI module faces tens of thousands of customers in different industries, forming a scale advantage. Direct cooperation with the original WIFI chip manufacturer to ensure cost advantage.

1.1. System block diagram



1. With a simple configuration, the Smart LCD Module equipped with the DWIN WIFI module will connect to the MQTT server through the "Connect A" channel.

2. The WIFI module will upload or download the DGUS register variables of the DWIN Smart LCD Module and the corresponding DGUS variables on the server.

3. Mobile terminal and background management through the MQTT server for data communication and interaction between servers. The mobile terminal mainly implements remote UI functions and variable modification functions. The background management can realize the function of variable modification control and file upgrade.

4. The third-party server can be the client's server, and the DGUS variable can be

operated by providing an interface to upgrade the file.

1.2. Access method

DWIN WIFI module and MQTT server and data relay server are mandatory for DWIN. The server for storing and processing business data can be DWIN's or the client's own server.

1.3. Characteristic parameters

The characteristics of the WIFI module are:

(1) Main chip ESP8266+4MB Flash

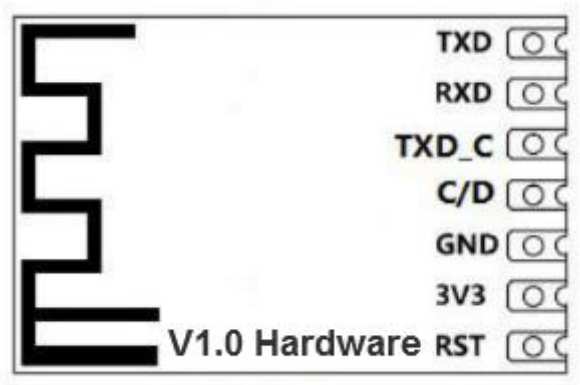
(2) Support 802.11 (2.4 GHz), frequency range 2.4G ~ 2.5G (2400M ~ 2483.5M)

(3) The antenna type includes PCB on-board antenna

(4) Maximum transmit power 14dBm

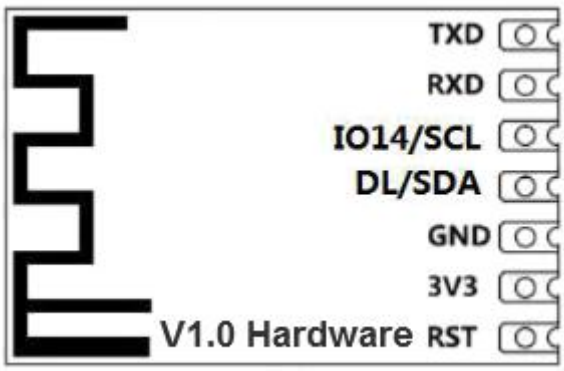
(5) Serial transmission rate 921600bps (transmission data rate on the device side)

1.4. Hardware interface



The V1.0 hardware package is defined as shown above, with a foot pitch of 2.0mm.

- WIFI module should have VCC (3.3V), GND, TXD, RXD, C/D, TXD_C, /RST 7 pins.
- TXD, RXD: Data channel, Baud rate 921600.
- TXD_C: has nothing to do with business, internal information printout pin, suspension processing.
- C/D: WIFI module download enable, internal pull-up resistance 10K. When the module is powered on, the pin is low, indicating that the boot mode is entered. Use suspension normally
- 3V3, GND: peak current of 300mA is required.
- /RST: Reset pin, which needs to be connected to reset chip for reliable reset. Low level reset WIFI module.



The definition of V2.0 hardware package is as shown above, and the foot pitch is

2.0mm.

the difference:

- IO14/SCL: I2C interface SCL, WIFI module output
- DL/SDA: WIFI module download enable, internal pull-up resistor 10K. When the module is powered on, this pin is low, it means to enter the boot mode. Normal use can be suspended.
- SDA of the I2C interface, if the I2C interface is enabled, the TX function of UART1 needs to be disabled

1.4.1. Interface between T5UID1_86 platform and WIFI module

The T5UID1_86A platform is an application of the standard T5UID1 platform on 86 boxes, and additionally defines IO and serial ports connected to WIFI. In the end, only UART4 was used, and the rest were not used.

T5 ASIC IO	WIFI_IO	Explanation
IO2	C/D	Connect the resistor, the hardware configuration download is enabled, it is not actually needed, and can be left floating
IO3	-	Power on key detection
UART4_TX	RXD	Serial port
UART4_RX	TXD	Serial port
IO1	TXD_C	Debugging information output, don't need to pay attention, can not be used in practice, can be left floating
UART6_RX		

1.4.2 T5L hardware platform interface

In the end, only UART1 was used, and the rest were not used.

T5L ASIC IO	WIFI Module IO	Explanation
IO18	C/D	Connect the resistor, the hardware configuration download is enabled
IO19	TXD_C	Debug information output, don't care
UART1_TX	RXD	Serial data

UART1_RX	TXD	Serial data

2. Development steps

2.1. Determine the platform

Platform	Explanation	Examples of products
T5UID1,T5UID2	1. The 22.bin file needs to be configured and uploaded 22. Bin file. 2. The 8283 instruction needs to be implemented in the OS. can Use the given routine code.	TR028C11W04 TC035C21W04 TR028C12W00 TC035C22W00
T5L ASIC	Just configure 22.bin file and load 22.bin File	

2.2. Stand-alone device program development

Same as the original DGUS stand-alone development, no special treatment

2.3. Access to cloud operations

Write 22.bin file to meet network access requirements, including product ID, display network connection status icon, etc., display version number and MAC address, etc.

2.4. Development of mobile terminal and cloud background

Log in to http://merchant.dwinhmi.com.cn/ for background management and develop apps.

3. DGUS platform interface definition

3.1. DGUS system read-write interface

The DGUS system generally interacts with external systems through memory data. The memory variable space is 0x0000-0xFFFF, where 0x0000-0x0FFF is the DGUS

system area, and 0x400-0x4FF in the system area is the network communication interface. The 0x1000-0xFFFF area is the user memory area.

The external device reads and writes the bus interface of DGUS system through UART, mainly 82H, 83H instructions.

Data block	1	2	3	4	5
Definition	Frame header	Data length	instruction	Data	CRC calibration (optional)
Data length	2	1	1	N	2
Explanation	0×5AA5	Including instructions, data, calibration	0×82/0×83		
Example (no calibration)	5A A5	04	83	00 10 04	
Example (calibration)	5A A5	06	83	00 10 04	25 A3

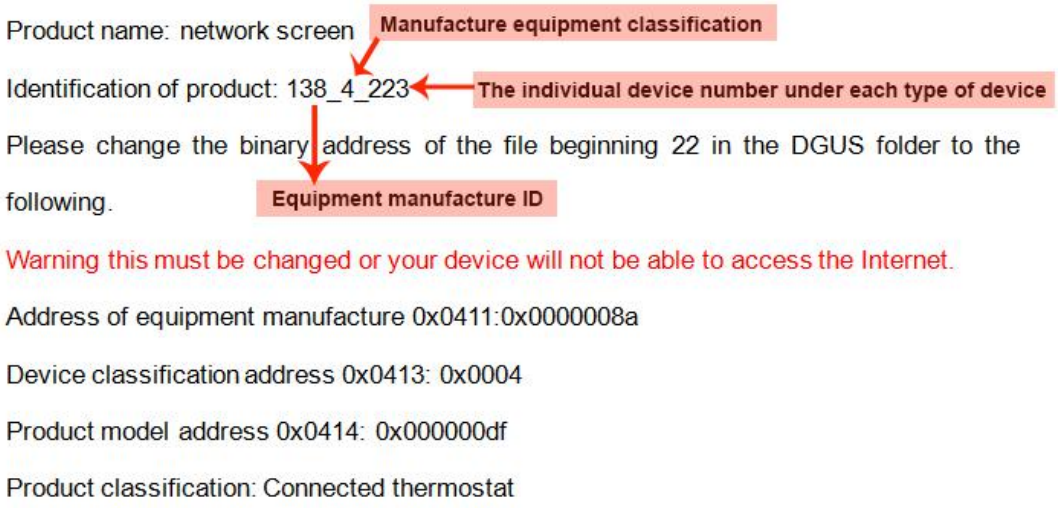
0×82	Issued: Variable space first address (0×0000-0×FFFF) + written data	Specify the address to start writing data string (word data) to the variable space. Do not write in the space reserved by the system
	answer: 0×4F, 0×4B	Write instruction response
0×83	Issued: Variable space first address (0×0000-0×FFFF) + read data word length (0×01-0×7D)	Read the specified length word data from the address specified in the variable space
	answer: Variable space first address + variable data word length + read variable data word	Data response

It should be noted that the length of the 82H/83H instruction is only 1 byte, that is, the maximum is 256 bytes. With the removal of the frame header and frame tail and the CRC, the general payload is about 240 bytes. Therefore, if there is a large amount of data interacting with the DGUS system, it needs to be broken into small packages for interaction. For example, the 4K data in the cloud is sent to the WIFI module. The WIFI module needs to be disassembled into small packages and written into the DGUS system variables in turn.

3.2. Network interface definition in DGUS system

The definition address of the network part in the DGUS system is in the area of 0x400-0x4FF, which is defined as follows:

Definition	Address	Length (word)	Recommended value(hex)	Instructions
Network switch interface	0x400	1	5AA5	0x5AA5 indicates that the network communication interface is enabled
				Recommended value description: Generally 0x5AA5 is written as a fixed value to 22 file. It is also possible to use the configuration button to return or incremental regulation and other touch controls to write the trigger key value 0x5AA5 to address 0x400 to achieve the opening of the network interface.
RAM ALARM	0x401	3	All are 00	D5-D4:0x5AA5 enable the RMA spatial data uploading immediately. D3-D2: RMA variable memory address to be uploaded. D1-D0: the word length of the RMA variable memory to be uploaded. (Currently up to 4KByte)
				Recommended value description: It is used to transmit the data of the variable address on the screen to the cloud server, which is usually applied to the cloud call view of the alarm history information and other parameters. If you do not need to use this function, you can fill in 0000 by default in 22 file.
Reserve	0x404	12	All are 00	Reserve.
Device description	0x410	1	5A45	High byte: 0x5A indicates that the device description is valid. Low byte: the encoding method and length of the device description text. .7-.6: encoding 0x00=UNICODE 0x01=GBK, GBK is recommended. .5-.0: describes the text length 0x00-0x34.
				Recommended value description: Write the configuration at a fixed value of the 22 file corresponding address, the encoding method GBK written here, the text length is 5
	0x411	2	00000001	Device manufacturer ID, assigned by DWIN factory, 0xFFFF: 0000 - 0xFFFF: FFFF segment is reserved. After the device is added to the DWIN cloud platform, it is automatically generated by the platform.
	0x413	1	0001	The classification of each manufacturer's equipment is according to the DWIN classification standard equipment classification. After the device is added to the DWIN cloud platform, it is automatically generated by the platform.
	0x414	2	user-defined	The individual device number of each type of device. After the device is added to the DWIN cloud platform, it is automatically generated by the platform.
	0x416	26	44475553325F543555494431(behind all 00)	Device description text, up to 52Bytes.
				Recommended value description: 44445553325F543555494431, corresponding to the ASCII code character DGUSII_T5UID1, has been written as a fixed value written in

				22 file. The user can also make a text variable address association for display.
	Example of cloud platform interface:  			
Device description (RMA mapping)	0x430	1	012C	RMA automatically refreshes the server interval 0x0000-0xFFFF in 0.1 seconds.
				Recommended value description: Writing 0x0000 means that no automatic refresh is required. 0x012C indicates that the automatic refresh interval is 30 seconds.
	0x431	1	1000	RMA (mapped to the server's variable memory) read space start address, word address, out of bounds can not be read.
				Recommended value description: 0x1000 means to start reading space from 0x1000 address.
	0x432	1	0004	RMA read space size in 128Words with a maximum size of 2KWords and 0x0000 indicates forbidden reading.
				The recommended value 0x0004 indicates a read space size of 512Words, which can be set to 0x01F4 at most.
	0x433	1	2000	RMA write space start address, can overlap with the read space, can not write out of bounds.
				The recommended value 0x2000 indicates reading space starting at the address 0x2000.
	0x434	1	0004	RMA write space size in 128Words with a maximum size of 2KWords, 0x0000 indicates write forbidden.
				The recommended value 0x0004 indicates a read space size of 512Words, which can be set to 0x01F4 at most.
	0x435	3	All are 00	reserved
Device description (remote upgrade)	0x438	1	5AA5	The remote upgrade interface is enabled. 0x5AA5 indicates that the device is enabled with the remote upgrade interface. The system will automatically detect the Buffer.
				Recommended value description: Generally 0x5AA5 is written as a fixed value to 22 file. It is also possible to use the configuration button

				return or incremental regulation and other touch controls to write the trigger key value 0x5AA5 to address 0x438 to achieve the switch.
	0x439	1	0064	Remote upgrade packet timeout timer configuration in 0.1 second.
	0x43A	4	5A 00010 00000 0F00	The first remote upgrade space for the device (aligned to 4KB) is defined: D7:0x5A indicates that the remote upgrade space is enabled. D6-D3: 32-bit start address of the upgradeable space (lower 12 bits is 0), up to 4 GB. D2-D0: The size of the upgradeable space, in 4KB, up to 4GB.
	0x43E	4	5A00 0000 0000 8000	The second remote upgradeable space definition for the device
	0x442	4	All are 00	The third remote upgradeable space definition for the device
	0x446	4	All are 00	The fourth remotable upgrade space definition for the device.
	0x44A	2	5A 00 08 B0 00	Remote upgrade Buffer interface definition: D3:0x5A indicates that the remote upgrade Buffer is valid. D2: upgrade mode 0x00= the communication side is responsible for verifying the data CRC, and the error frame informs the host to resend. D1: the number of buffers available for remote upgrades, 0x01-0x10, up to 16. D0: the starting address of Buffer0 is high byte (word address) and low address is 8bit 0x00. Each Buffer is fixed in 2304 words (0x900) space, which is arranged in the back row. A single Buffer definition (the first 512 bytes is the control interface, the next 4KB is the data): D0:0x5A means to start the remote upgrade of this buffer once, and clear it after CPU processing. D1: Remote upgrade space selection, 0x00-0x03, one of 4 remote upgrade spaces. D2-D5: Write the destination address of the remote upgrade space. The lower 12 bits are 0 (aligned to 4KB). D6-D7: Data byte length, 0x0001-0x0FFF. D8-D9: Data CRC checksum. D10-D511: Reserved. D512: Data starts, up to 4096 bytes.
	0x44C	4	All are 00	reserve
Device description reserved	0x450	48	All are 00	QR_Code device QR code
Communication device description	0x480	16	User-defined	D31: 0x5A indicates that the communication device description data is valid. D30: The encoding method and length of the device description text. .7-.6 encode mode 0x00=UNICODE 0x01=GBK, GBK is recommended. .5- .0 Description: The length of the text is 0x00-0x14. D29: Communication device category 0x01=WiFi

				D28: Communication device status, bit definition .7 Equipment working status 0=Configuration 1=Normal; .6-.3 undefined, write 0; .2- .0 signal quality, 0x00-0x07 A total of 8 files, 0x00 means the worst, 0x07 means the best. D27-D22: 6Bytes communication device MAC address D21-D20:reserved D19-D0: Description of the communication device in text format, up to 20Bytes.
Communication device reserved	0x490	8	User-defined	Customize the communication device, such as WIFI username and password.

The device description information is corresponding to the 0x0800-0x09FF byte address of the 22 initialization file, and the corresponding content configuration (regardless of whether the 22 file initialization variable buffer function is enabled, the underlying layer will automatically handle the loading).

4. WIFI register interface definition

The address of 0x400-0x47F is the communication interface of the DGUS system, and the address of 0x480-0x4FF is the function and status interface of the specific

communication module or device.

Different network modules and devices have different definitions. The following is the definition of WIFI module.

Definition	Address	Length (word)	Recommended value (hex)	Instructions
Communication device description	0x480	16	User-defined	D31: 0x5A indicates that the communication device description data is valid. D30: The encoding method and length of the device description text. .7-.6 encode mode 0x00=UNICODE 0x01=GBK, GBK is recommended. .5- .0 Description: The length of the text is 0x00-0x14. D29: Communication device category 0x01=WiFi D28: Communication device status, bit definition .7 Equipment working status 0=Configuration 1=Normal; .6-.3 undefined, write 0; .2- .0 signal quality, 0x00-0x07 A total of 8 files, 0x00 means the worst, 0x07 means the best. D27-D22=6Bytes MAC address of communication equipment, D21-D20 are reserved. D19-D0: The description information of the communication device in text format, up to 20Bytes. Where D19:D18 is fixed in position indication "OK", D17-D0 wifi module version number
WIFI hardware parameter Set up	0x490	8	User-defined	Restart WIFI module is valid D15-D14: The baud rate setting is reserved. Currently fixed at 921600bps, it cannot be set. D13-D9: keep the local IP address D13: 5A means the IP address is valid D12-D9: IP address XX.XX.XX.XX (such as decimal 192.168.10.150) D8: WIFI module switching Debug firmware 5A means valid. D7: D0: WIFI module type identification information Default "DWD100".
WiFi_Config	0x498	4		D7: Writing 5A means starting the WIFI configure network, and the configure network is completed. The value is cleared to 0. D6: 0x5A means to start the network name and password to connect to the router (the network name and password are saved at 0x4B0) D6:0XA5 indicates that start scanF scan function result is placed at 0x4D0

				D7-D6, as long as it is started once, D7-D6 will be cleared at the same time after completion. The two Internet access modes cannot be started at the same time. If they are all 5A, the one-click configure network takes precedence. D5: Network time 5A means the screen comes with RTC (0x9C); 5B means RTC library RTC (0xF430) D4-D2: D4:0x5A means the UDP port setting is valid D3-D2: UDP port number D1: The WIFI module is automatically upgraded. 5A means enable. D0: Soft reset. 5A initiates reset and reset is cleared to 0.
				The user can design the configure button in the UI. Start manual configure network touch button (press to return 0x498 address write 0x005A) Start one-key configure network touch button (press to return 0x498 address write 0x5A00)
Reserve	0x49C	4	All are 00	reserved
network status	0x4A0	8		D15-d14 (0x4A0) reserved, the wifi version number is displayed at the 0x487 position ASC code D13-d12: configure network status feedback 00: unmatched network 01: start configure network 02: in the configure network 03: configure network success 0F: configure network failure D11-d10: network connection status 00:user name and password not obtained 01:WIFI router connection is successful 02: WIFI module self-upgrade 03: connect to the server 04: logged in to the server 05: connected to the cloud D9-D8: (0x4A3) network strength (same as 481) D7-D6: Reserved D5-D2: Reserved D1-D0: (0x4A7) Keep the counter, and each cycle period (<1s) will increase by 1. DGUS finds that the value has not changed for a long time, and it can be considered that the WIFI module has crashed. For the next step
Program running status	0x4A8	4		D7: state machine. D6: UART state machine. D3-D0: remaining stack space.
Network RTC	0x4AC	4		D7:5A means the time is valid. D6-D0:Year Month Day Week (0-6) Hours Minutes Seconds
Network	0x4B0	32		0x4B0: SSID, the end must end 0xFF.

parameters				0x4C0: SN, the end must end at 0xFF.
	0x4D0	48		0x4D0: Save, the name of the SSID split by \n

The registers that DGUS sends commands to WIFI such as 400H, 490H, etc., will be actively read by the WIFI module every 0.1s-0.2s.

The status of the WIFI module is 480H, 4A0H. These registers will be written into the DGUS register every 3-5 seconds.

4.1 Operation instructions:

Instructions:

- Edit the 22.bin file template and modify the values you need
- The router's network name and password settings: 498H register write 005AH enable, 4B0H set SSID and password; you can also do not set, start one-click network configuration in the application.
- The T5UID1 platform requires the 8283 instruction code added to the OS, and an interrupt is required to detect the WIFI serial port, please refer to the routine for details. The T5L platform does not require any processing.

4.2 UI operation instructions: (need to make icons for status indication)

4.2.1 Mobile phone one-click network configuration page:

Touch: start one-key network configuration button (press to return to 0x498 address and write 0x5A00)

Display:

- One-click network configuration status icon (0x4A1 address: 00 Network not configured 01 start network configuration 02 network configuration 03 network configuration success 0F network configuration failure);
- WIFI connection status icon (0x4A2 address: 00 User name and password not obtained 01: WIFI router connected successfully 02: WIFI module self-upgrade 03: connected to the server 04: logged into the server 05: connected to the cloud)

- WIFI module MAC address (0x482-484 address: hexadecimal display, 12 bytes ASCII length display)

- WIFI module version number: (0x487 address: ASC code string display, length 18 bytes)

4.2.2 Manually enter the network name and password mode

Touch:

- Network name text input (0x4B0 address), network password text input (0x4C0 address)

- Start to connect to the network button (Press to return to 0x498 address and write 0x005A)

Display:

- WIFI connection status icon (0x4A2 address: 00 User name and password not obtained 01: WIFI router connected successfully 02: WIFI module self-upgrade 03: connected to the server 04: logged into the server 05: connected to the cloud)

- WIFI module MAC address (0x482-484 address: hexadecimal display, 12 bytes ASCII length display)

- WIFI module version number: (0x487 address: ASC code string display, length 18 bytes) After that, the WIFI module will automatically surf the Internet and start data synchronization

4.3 Workflow of WIFI module serial port side:

4.3.1 Read the configuration information: After the WIFI module is powered on, read the 0x400-4FF configuration information, and enter the next state after reading it.

4.3.2 Status between WIFI module and DGUS:

- a. Lowest priority 0: read DGUS variables (83 instructions) every 0.1-0.2 seconds, 400H, 490H, etc. involve DGUS issuing instructions. Every 3-5 seconds, the necessary state of the WIFI module is written into DGUS through the 82 command.

- b. Second-lowest priority 1: Whether the synchronization timing with the server

interface has expired, and then the specified big data will be periodically uploaded.

- C. Second-lowest priority 2: Detect whether the RMA alarm interface is enabled, and then perform triggered upload of designated big data.

- d. Second highest priority 3: Triggered upload of network configuration, network timing, and network status change to DGUS. For example, in distribution network, during network login, once the status changes, it will be written to DGUS immediately.

- E. High priority 4: file upgrade. When the first file upgrade package is received, normal task scheduling will be suspended to ensure that resources are sent to DGUS in MQTT and serial port as much as possible. Allow other 82H/83H instructions to be generated.

4.4 Workflow on the MQTT side of the WIFI module:

- Initialize after power on, wait for 512bytes configuration word

- Wait for the router to connect

- Determine whether to upgrade the WIFI module. If you need to upgrade the WIFI module, upgrade the WIFI module. After the upgrade is successful, it will automatically restart

- Access the REG registration API through the HTTP protocol and get the user name and password to log in to the MQTT server

- Re-establish the connection and log in to the MQTT server with the user name and password

- Subscribe to topic channels and send online notifications.

- After the data channel is established, you can perform 82H and 85H read and write instructions with the server, synchronize the registers, and use 92H and 93H instructions to perform file buffering.

5. WIFI communication with the server

The maximum buffer of one frame left in the WIFI module is 5K (5120), that is, the maximum packet length with the server is 5K

5.1. Overview

5.1.1 The current data synchronization is not responding to commands, why?

- The data is centered on the device, and the data of the device is the basis. The device itself has an automatic timing reporting mechanism. The data on the mobile phone is only used for UI display and cannot reflect the real device status.

- The data uses a full packet transmission mechanism. That is to say, when the device sends data to the server, every frame tries to pass all the data as far as possible.

- If the mobile phone controls a certain operation and the device does not receive it, the mobile phone can first lock the display data to the request state, and then display the real value and overwrite the display value after the timeout (for example, 5 seconds). The data on the mobile phone is considered unreliable data, and the real data will always be reported and synchronized by the device.

- The non-response mechanism will simplify the synchronization mechanism of each process, simplify complex problems, and finally (automatically report if it is 30s) will display all display terminals in the state of the device.

5.1.2 If there is no response, how does data convergence work?

The automatic data convergence is mainly achieved by the device actively reporting and periodically reporting.

- The server writes data to the device and receives no response.

- However, after the server writes data to the device, it may also receive new data immediately. After the device finds that the variable has changed, it automatically triggers the automatic reporting function and issues the 0x85 command, which is the variable upload of the entire block.

- If the data sent by the server to the device is not updated, it will not be reported automatically. The command was not answered originally. The device did not find the variable change, nor will it immediately trigger the report, so the server will not receive the 0x85 command

If the instructions distinguish between writing and reading, they are all for

transferring registers.

The commands currently supported by the WIFI module and the server:

- The server writes data 0x82 to the device, and the WIFI module receives the server's instruction 82, then writes data to the device. There is currently no response to this command (if it is answered, it should be 0x83 according to the protocol, and the response is "OK" (4F 4B).

- The server requests 0x84 to read data from the device, and the WIFI module receives the command type 0x84 from the server. After receiving this instruction, the WIFI module replies to the server 0x85 to answer the instruction, and at the same time brings the data. After the server receives the 85 instruction, it needs to write the data into the server's mapped memory block.

- The device writes data to the server

- The device reads data from the server

In fact, in the end, data only needs to be transmitted from the device to the server, or from the server to the device. The function described by the device writing data to the server is replaced by the 0x85 instruction. The function described by the device reading data from the server is replaced by the 0x82 instruction.

Finally, only 0x82 instructions, 0x84, 0x85 instructions were reserved. 0x82 implements data transfer from the server to the device, 0x85 command implements data transfer from the device to the server, and 0x84 command implements server actively querying the device's registers.

5.2 Frame structure

5.2.1. RAM write operation

Mainly use RAM to write, especially the server writes to the device RAM

Frame header (2B)	Frame length remaining (2B)	Frame type	Address (2B)	Word data flow
AA55	Max 5117	0x82: write	XXXX	

RAM write response (not currently implemented):

Frame header (2B)	Frame length remaining (2B)	Frame type	Address (2B)	Word data flow
AA55	Max 5117	0x83: write response	XXXX	4F4B

5.2.2. RAM read operation

Active query use refers to the server querying the device.

sender

Frame header (2B)	Frame length remaining (2B)	Frame type	Address (2B)	Word data flow
AA55	5	0x84: read		

Responder (This response can be used as an instruction to be actively reported by the device)

Frame header (2B)	Frame length remaining (2B)	Frame type	Address (2B)	Word data flow
AA55	5	0x85: read response		

5.2.3. Upgrade BUF frame

Server to device

Frame header (2B)	Frame length remaining (2B)	Frame type	BID (2B)	BUF structure

AA55	5	0x92: Upgrade BUF write	BUF ID number	D0: 0x5A means to start a remote upgrade of this buffer, which is cleared after CPU processing. D1: Remote upgrade space selection, 0x00-0x03, one of 4 remote upgrade spaces. D2-D5: Write the target address of the remote upgrade space, the lower 12 bits are 0 (aligned to 4KB). D6-D7: data byte length, 0x0001-0x1000. D8-D9: data CRC checksum. D10-D511: Reserved. D512: Start of data, up to 4096 bytes.

Response

Frame header (2B)	Frame length remaining (2B)	Frame type	BID (2B)
AA55	0×02	0x93: Upgrade BUF write response	BUF ID number

5.3. Initialization process

WIFI and server operation process: (mainly communicate through DGUS business theme)

- After WIFI is powered on, use the content of 0x411-0x413 as PID and MAC address as DID to register with the registration server, get the login information, and then log in to the server.
- Subscribe to DGUS business topics.
- Write the 0x400-0x4FF data in DGUS to the server through the DGUS business theme.
- After the initialization is completed, all the data frame structures will be in the topic in the future.

5.4 Data communication

RMA operation, frame type is 0x82 or 0x83.

The communication frame header with the server is 0xAA 55 data stream.

After receiving the data stream from the server, the WIFI module is converted into a DGUS frame structure and reads and writes to DGUS.

5.5. BUF upgrade

The server converts the corresponding address (4G space) according to the DGUS file rules. Then form a BUF application frame.

The BUF frame is put into the communication frame as a payload.

After receiving the BUF, the WIFI answers the BUFID.

5.6 Use of UDP485 bus

- The address to be uploaded 0x402 is set to the address to be uploaded. For example: 0X3800
- Set the length of the data to be uploaded at 0x403 For example: 0x0010
- Need to set 0x401 to 0x7AA7, after sending, it will be cleared automatically

The data will be broadcast to all devices in the local area network through UDP. Other devices will get the data and write the data to the local 3800 address to overwrite the original data. The specific data will be determined by the device.

5.6.1. Writing the frame structure of UDP bus

UDP write operation: mainly use RAM to write to device RAM

Frame header	Frame length	Frame type	Address (2B)	Word data flow

(2B)	remaining (2B)			
AA55	Max1024	0x72: write	XXXX	