V5008 AIoT Gateway Northbound Communication Protocol

V1.8.3

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1. Version Information

Number	Date	Version	Changes	Editor
1	2021-6-2	V1.0		LZJ
2	2021-10-18	V1.1		LZJ、LMK
3	2022-01-13	V1.5.3	Merge the communication protocol documents for V6800 and V5008.	XiaoXiao、LZJ、LMK
4	2022-03-7	V1.5.6	Modify the document title from "V6800 and V5008U Intelligent Gateway Communication Protocol Document" to "U-unit Intelligent Gateway Northbound Communication Protocol (Supporting V6800 and V5008)."	Jamesliu
5	2023-02-01	V1.5.7	Enhance definition content and add precautions for V5008 actively obtaining commands.	XiaoXiao
6	2023-04-25	V1.5.8	Add explanations for single-Door Infrared Sensor and double-Door Infrared Sensor responses.	XiaoXiao
7	2023-07-28	V1.6	Remove the V6800 protocol section and standardize naming.	ZhangRC
8	2024-05-21	V1.7	1. Modify the color of the U-level indicator and disable the alarm protocol for U-level anti-demolition	ZhangRC

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			2. Delete query logs 3. Add the packet identification number 4. View device information modification	
9	2024-07-10	V1.7.1	1.Unify the professional name 2.Add the protocol transmission direction 3.Deleted Chapter 6 Protocol Interface Testing 4. Add the flowchart of the 4.3 agreement 5. The note in the U-level anti-theft alarm release has been modified.	ZhangRC
10	2024-09-04	1.7.2	Obtain the light color	ZhangRC
11	2025-07-15	V1.7.3	1. Update 4.1. Protocol Flowchart 2. Update 4.3. Definition of U-level Numbers in the Protocol 3. Add 5.1. List of Message Types 4. Add Appendix 1. Three U-level Indicator Light Modes 5. Update Appendix 2. U-level Indicator Light Color Code Table 6. Change the description of message data frames to a table 7. Optimize the wording expression 8. Delete the white light control	ZhangRC

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			protocol in Appendix 2.	
12	2025-10-13	V1.8.0	Add noise protocol	ZhangRC
13	2025-11.20	V1.8.1	1.Glossary section: Add explanations for the C68 module 2.Add a chapter: Differences in Networking Protocols between C68 and C60. Optimize the explanations in the "U-level master module RS485 address/C68 module RS485 address" and "U-level master module ID / C68 module ID" sections of the northbound communication protocol chapter	ZhangRC
14	2025-12-01	V1.8.2	1. Add Section 4.2 "4.2. Rules for Gateway Connecting to MQTT Server"	ZhangRC

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			2. Add the networking method of C68 to Section 4.3 "Networking Methods" 3. Provide the applicable version description for message identification numbers in the northbound protocol	
14	2025-12-04	V1.8.3	1. Notes for modifying the Networking Methods section 2. Add a reminder about the use of door magnets in the door status section	ZhangRC

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2. Overview

The V5008 AIoT Gateway is a device used in data center IT asset digitization and control scenarios. It can support thousands of sensors simultaneously, automatically collecting data such as the physical locations of servers, switches, network storage devices, the status of devices being installed or removed, the usage status of U-Levels, and the microenvironment of cabinet inlet and outlet vents. This data is then transmitted to the server via the network.

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3. Glossary

Noun	Definition
Critical Information Assets	Critical information assets refer to devices responsible for key tasks in data center cabinets, such as servers, network switches, network storage devices, routers, and network security equipment.
U-Level	U-Level, an abbreviation for "unit", is a measurement unit representing the space for one standard-sized device (such as a server) in a cabinet. It is also a unit of measurement for the external dimensions of servers. It is defined by the Electronic Industries Alliance (EIA), with a standard U size of width 48.26cm and height 4.445cm.
U-level Module	The U-level Module is an intelligent sensor matrix device installed at the corresponding positions within the rack U-Level. Its main function is to map physical U-Level positions into digital U-Level positions. The Digitalor U-level Module adopts MC-RFID patented technology, featuring 100% accurate data, high reliability, and maintenance-free characteristics, leading the industry. It is composed of a main U-level Module and slave U-level Modules, with a maximum of 54 U-Level positions.
U-level number	In the protocol, the U-level number is defined as the sequential number of the U-level starting from the connection terminal of the master module. For each additional U, the U-level number increases by 1. The starting number is 1 (example: 1, 2, 3... 42).
The V5008 AIoT Gateway	The V5008 AIoT Gateway is an intelligent device capable of automatically managing hundreds of sensors in multiple cabinets and autonomously uploading data to a big data platform.
Humiture Module	Intelligent sensor module for collecting temperature and humidity.

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Noise monitoring module RS485 address	It refers to the address code of the RS-485 communication interface on this module. Usually, each cabinet is equipped with three temperature and humidity monitoring modules for monitoring the environmental noise of the cabinet, located at the top, middle, and bottom positions respectively. Their addresses are: 16, 17, and 18. These addresses were set at the factory, and their wiring method is the same as that of the temperature and humidity monitoring modules. They also support random series connection of temperature, humidity, and noise.
Door Infrared Sensor	Intelligent sensor device for detecting cabinet door open/close status.
expansion module	The interface connecting the sensor to the V5008 AIoT Gateway, there are two models of expansion modules, C60 and C68. The difference lies in that C60 can connect to 1 Door Infrared Sensor switch, while C68 can connect to two Door Infrared Sensor switches.Among them, C60 has no ID and no address, while C68 has an ID and an address.
U-level Tag	Used for real-time detection and identification of the physical location and identity information of assets.
V5008 AIoT Gateway ID	V5008 AIoT Gateway's globally unique identity identifier.
C68 Module ID	The globally unique identity identifier of the C68 expansion module. (When using the C68 expansion module for networking, the ID of the main module at position U will be replaced by the ID of the C68 expansion module.)
The U-level Module ID	The globally unique identity of the U-level Module.
C68 module RS485 address	Address range [1,10]. The gateway obtains the specified U-bit main module data through the address number (when using C68, the RS485 address of the main module should be consistent with it)
U-level master module	Address range [1, 10]. The gateway obtains the data of the designated U-bit main module through the address number.

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RS485 address	
Humiture Module RS485 address	It refers to the address code of the RS-485 communication interface on the module. Usually, each cabinet is equipped with six Humiture Modules for cabinet environmental monitoring, which are respectively the positions of the upper, middle and lower inlet and the upper, middle and lower outlet. The addresses are respectively: 10, 11, 12, 13, 14 and 15, and the addresses have been set when leaving the factory.
U-Level asset tag ID	The globally unique identity of the U-Level asset tag.

4. Description of U-Level digitization system

4.1. Protocol Flowchart

When the AIoT gateway acts as the publisher and the service platform acts as the subscriber, as shown in the following diagram

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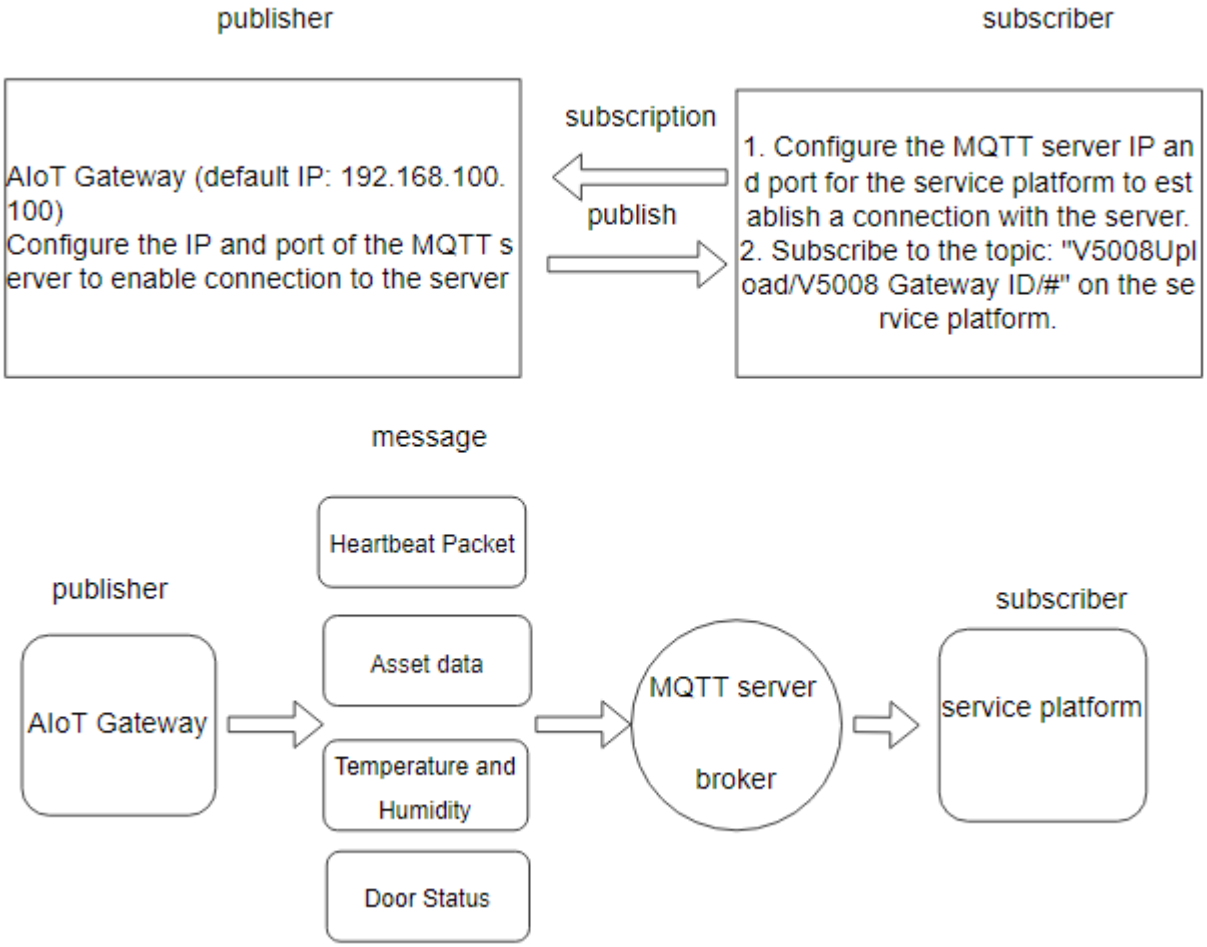

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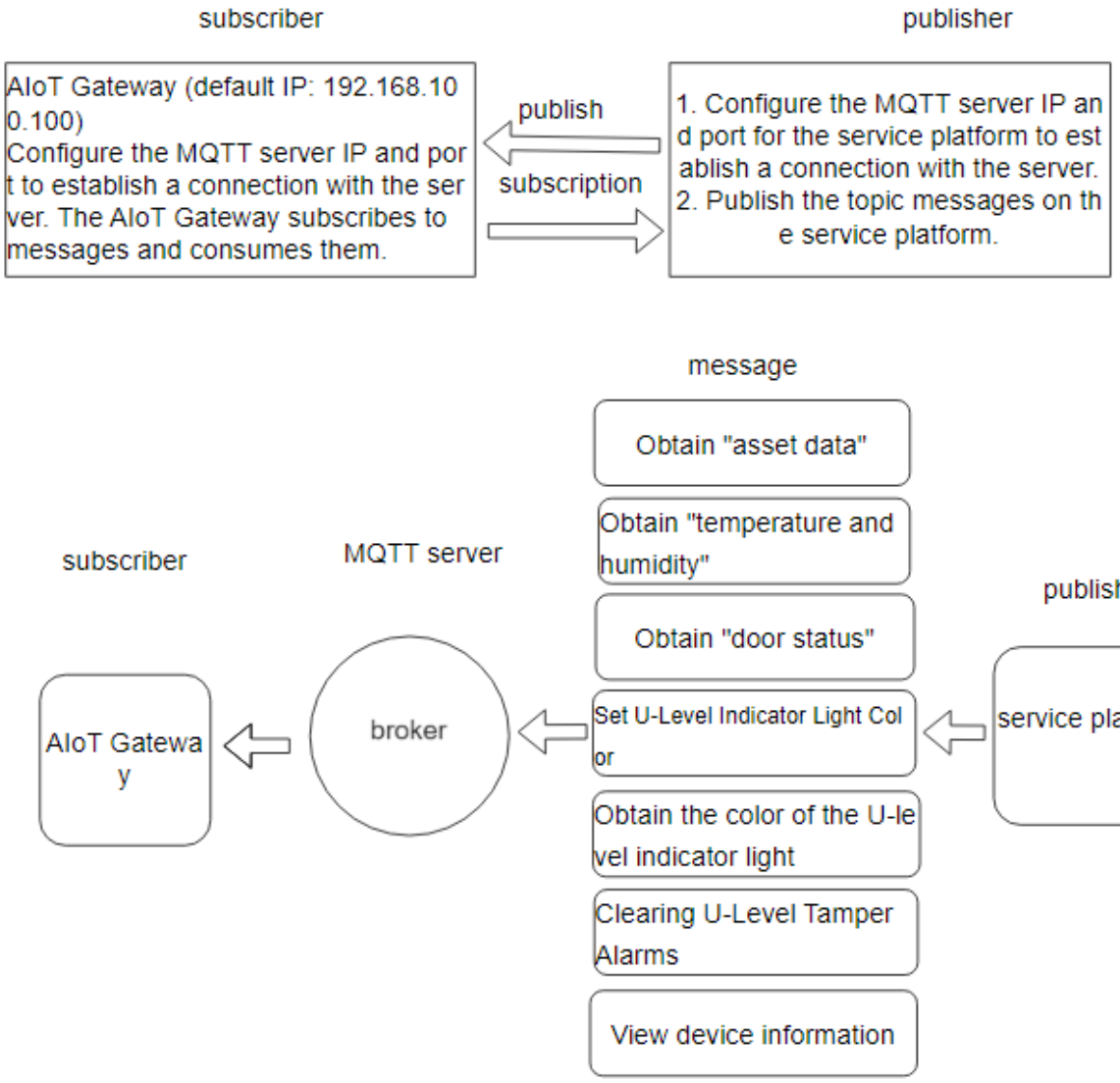
When the service platform acts as the publisher, the AIoT gateway acts as the subscriber, as shown in the following diagram



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4.2. Rules for Gateway Connecting to MQTT Server

The gateway can be configured with three MQTT server IPs, namely IP1, IP2, and IP3. When the gateway is powered on, it will first attempt to connect to IP1. If the connection fails after one attempt, it will switch to the next one, and the connection process will continue in the order of "IP1, IP2, IP3", repeating until a connection is established.

4.3. Networking Methods

⚠Notes:

The V5008 gateway has three different networking modes (namely "Networking 1/Networking 2/Networking 3"). The firmware versions of the gateway are incompatible under different networking modes. That is, after you change the networking mode of the V5008, you need to upgrade the gateway device to the corresponding firmware version. If you have any questions, please contact the manufacturer to confirm and ensure that you are using the correct firmware version of the gateway.

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Networking 1 (without using the expansion module):One gateway controls one cabinet's U-level Module. The system networking is shown in the following diagram. (The address of the U-level master module is arbitrary.)

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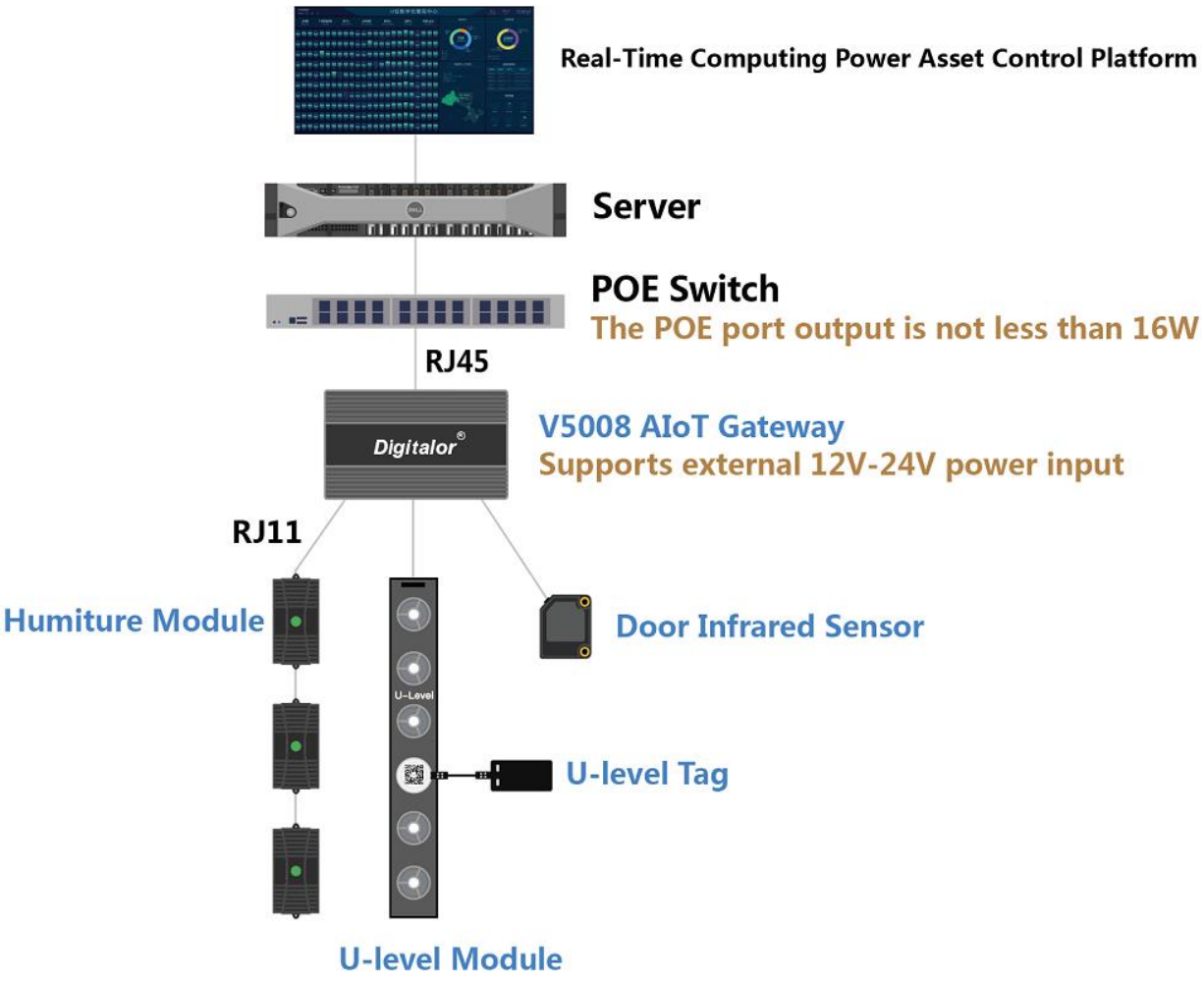

The wiring interface descriptions for its V5008 AIoT gateway, U-level Module, temperature and humidity monitoring module (the noise monitoring module supports random connection with the temperature and humidity modules), and infrared door magnetic sensor are shown in the following

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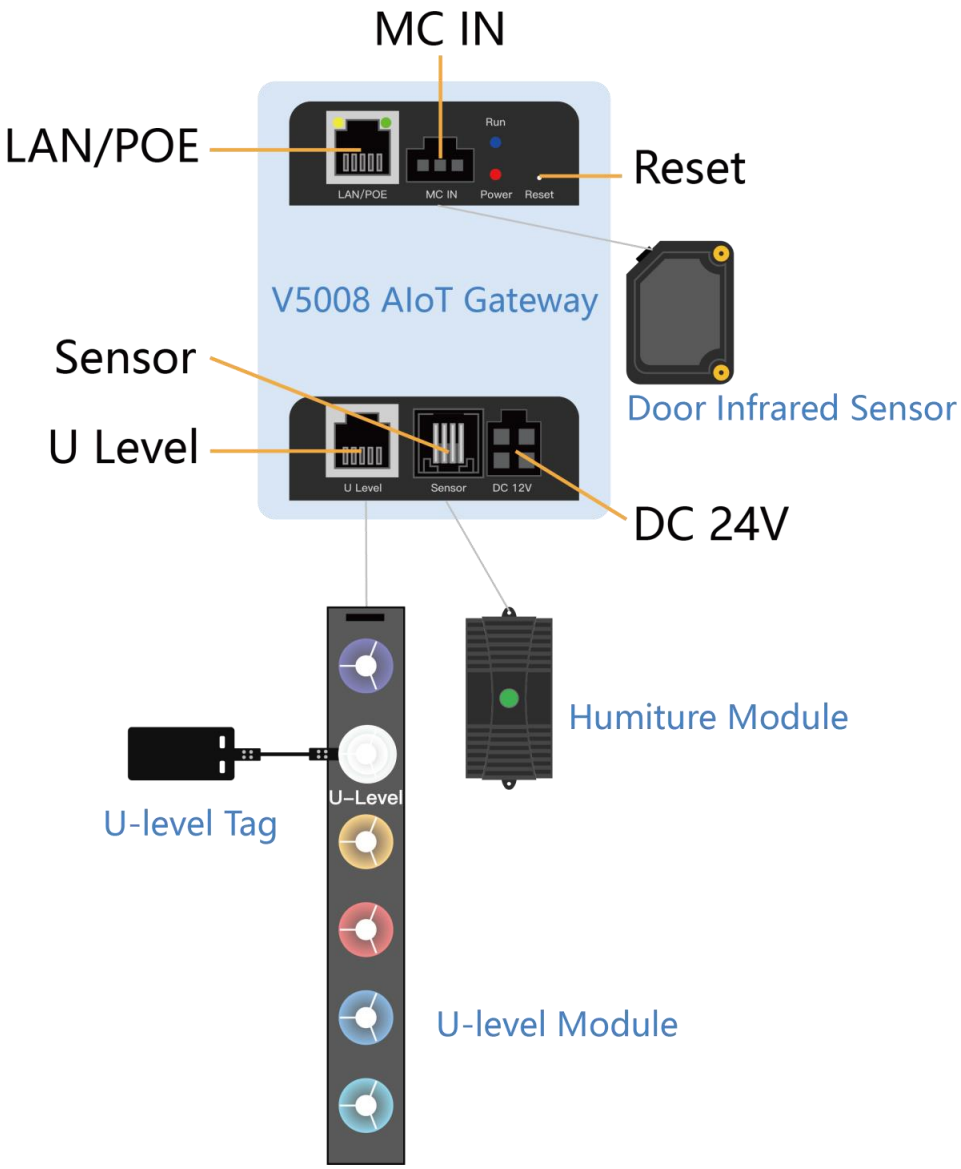
figure.



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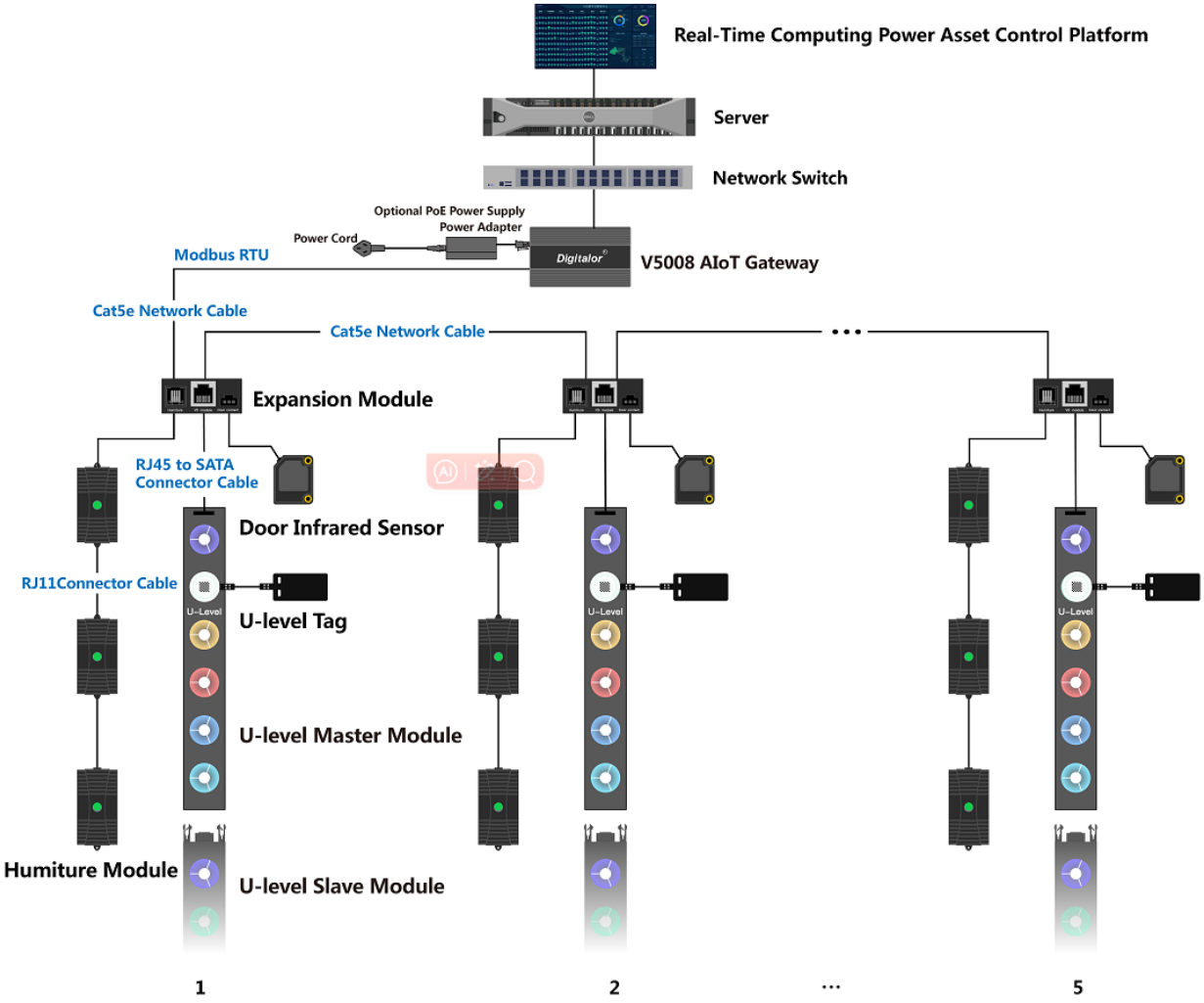
Networking 2(C60 Expansion Module): One gateway, through the C60 expansion module, can manage up to five U-level Module in the cabinets. It supports single door magnetic sensors. The system networking is shown in the following diagram. (⚠Note: If multiple C60s are used for networking, the Modbus address of the U-level master module must be unique.)



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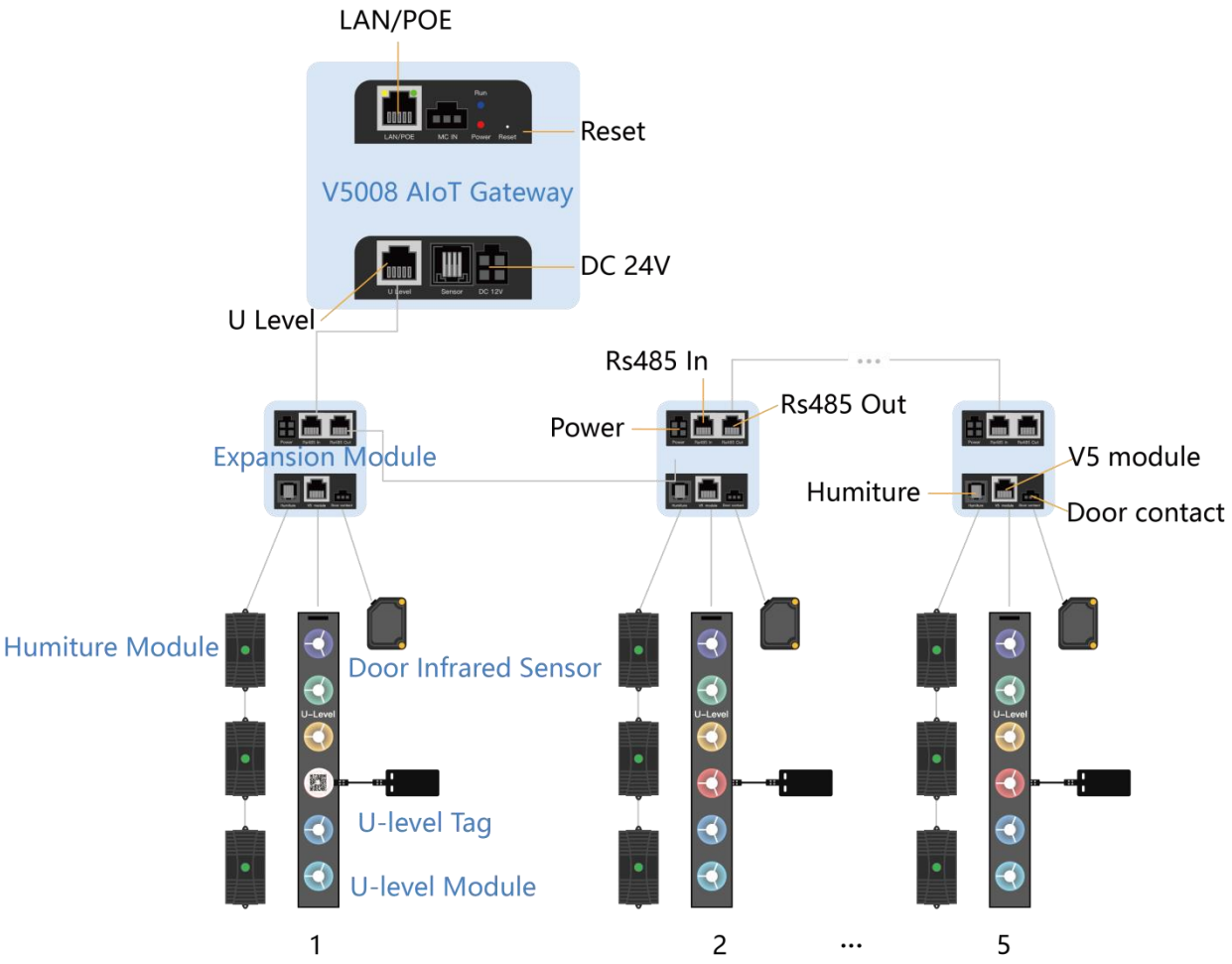
The wiring interface descriptions for its V5008 AIoT gateway, C60 expansion module, U-level module , and temperature/humidity monitoring module (the noise monitoring module supports random connection with the temperature/humidity module) are shown in the following figure.



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Networking 3(C68 Expansion Module):One gateway, through the C68 expansion module, can manage up to five U-level module of the cabinets. It supports dual door magnets. The system networking is shown in the following figure. (⚠ Note: If multiple C68s are used for networking, it is required that the Modbus addresses of the C68s be unique, and the Modbus address of the U-level master module should be the same as that of the C68.)

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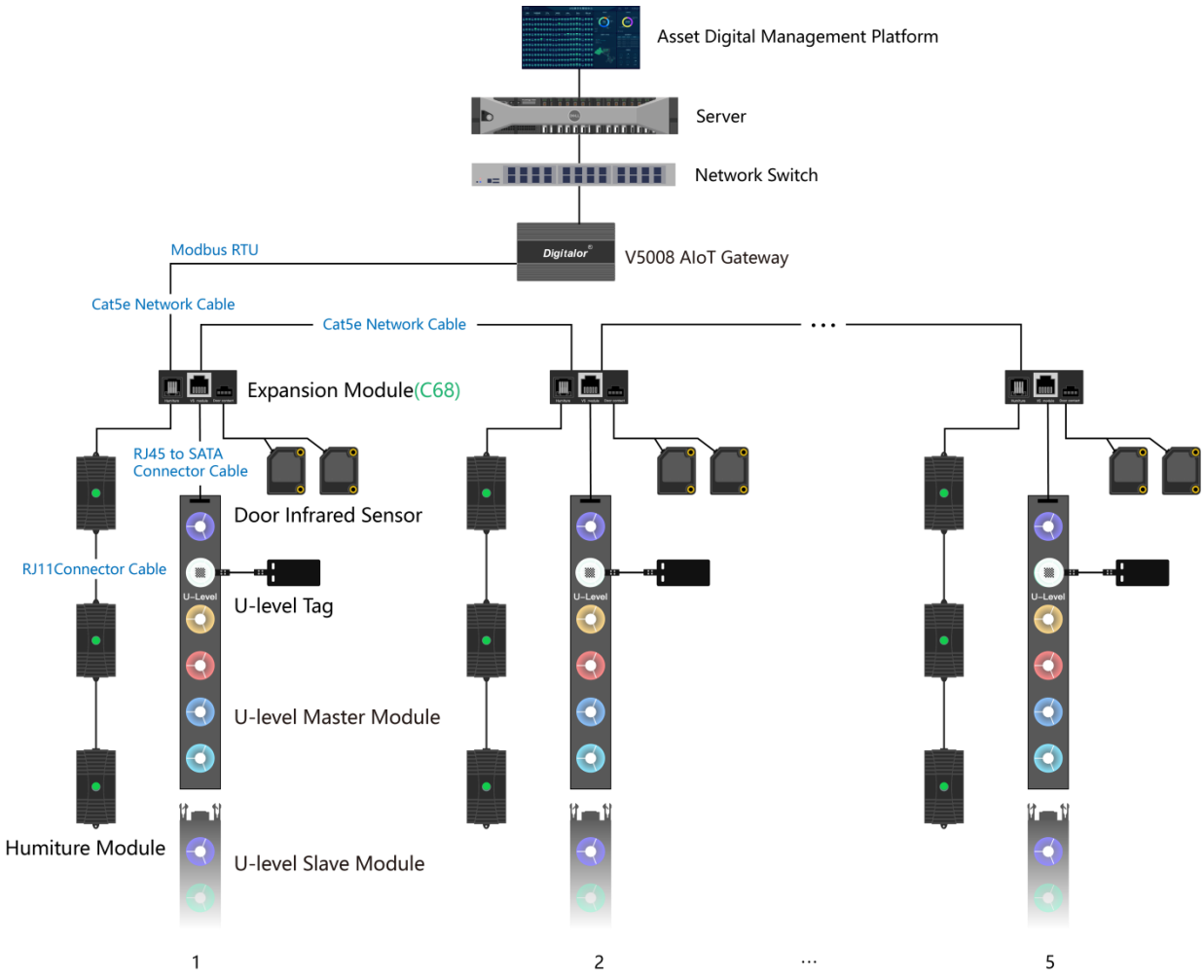

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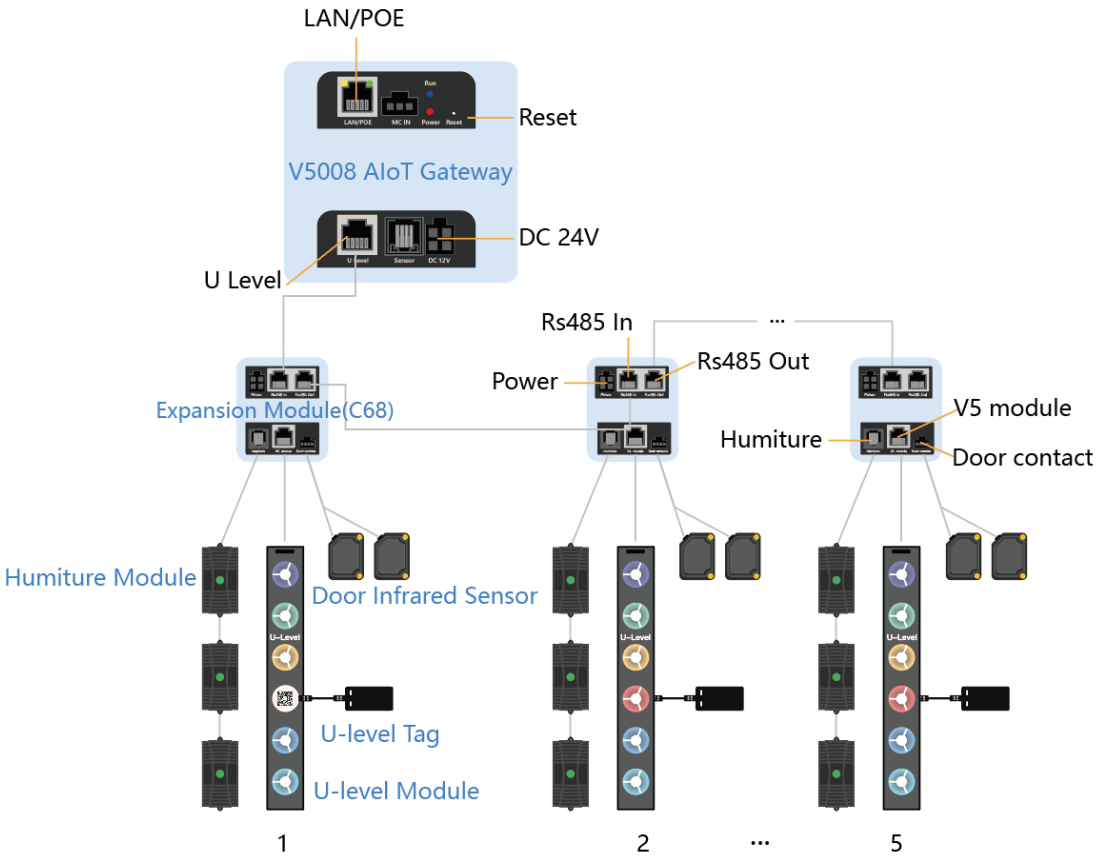
The wiring interface descriptions for its V5008 AIoT gateway, C68 expansion module, U-level master module , and temperature/humidity monitoring module (the noise monitoring module supports random connection with the temperature/humidity module) are shown in the following figure.



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4.4. Definition of U-level number in the agreement

The U-level number definition in the agreement: The sequential number of the U-level starting from the master module terminal, with each additional U increasing the U-level number by 1, starting from 1 (example: 1, 2, 3... 42).

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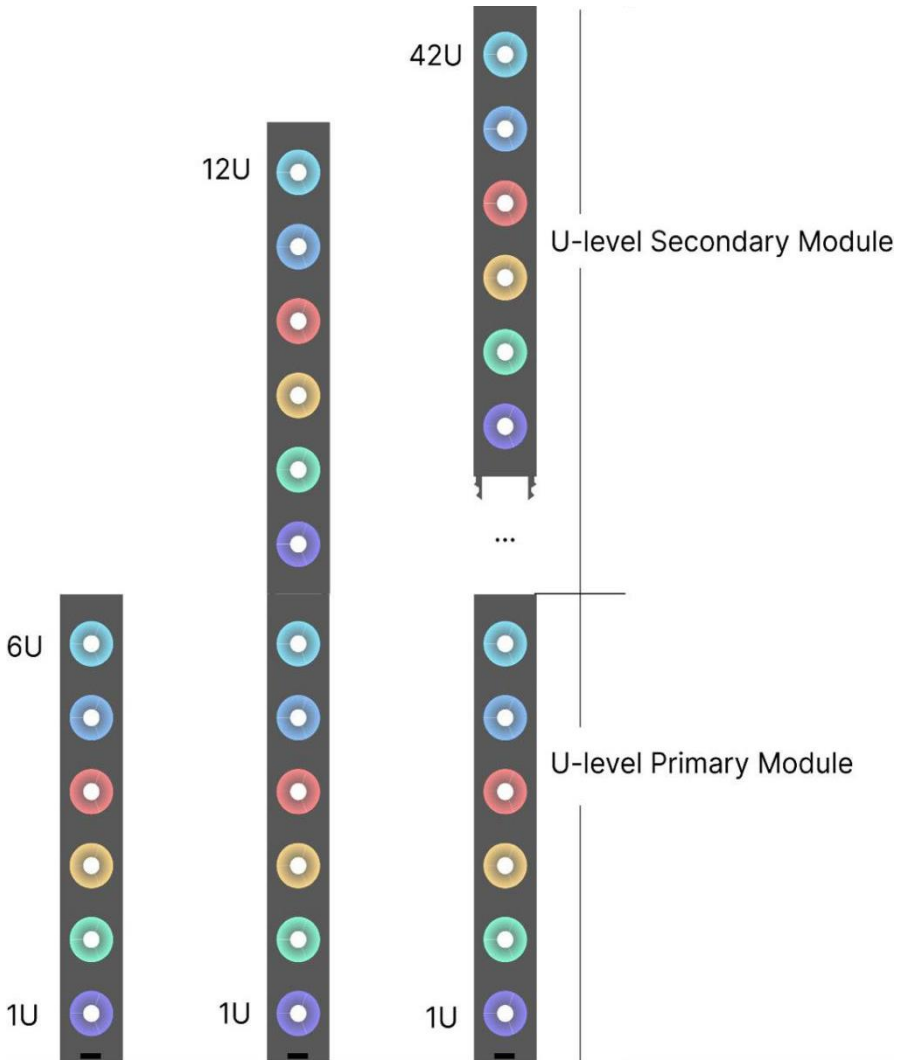

⚠Note: The U-level numbers in the agreement may not be exactly the same as the digital numbers on the U-level module hardware.

5. Northbound communication protocol

5.1. List of Message Types

Message type	functional description	comment
Heartbeat Packet	The V5008 gateway sends heartbeat packets to the MQTT server at 60-second intervals. At the same time,	One-way message

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	when the U-level module is online or when the total number of U-levels changes, it will report the information in an event-triggered manner.	
Asset data	The MQTT server supports active query of asset data. Meanwhile, the V5008 gateway will push real-time change information when the asset tags are removed or replaced. When the anti-theft tag of the U-level asset is torn off, the V5008 gateway will also push the latest change information in real time.	Bidirectional message
Temperature and Humidity	The MQTT server supports active query of temperature and humidity data. Meanwhile, when the temperature and humidity changes exceed the threshold (±0.5℃/±1%RH), the V5008 gateway will automatically report the latest data.	Bidirectional message
Door Status	The MQTT server can query the status of the door, and at the same time, the V5008 gateway will report the door status changes in real time.	Bidirectional message
Set U-Level Indicator Light Color	The MQTT server sends instructions to the V5008 gateway, setting the color of the indicator lights.	One-way message
Obtain the color of the U-level indicator light	The MQTT server sends a request to the V5008 gateway to obtain the color of the indicator light.	One-way message
Clearing U-Level Tamper Alarms	The MQTT server issues an instruction to the V5008 gateway to cancel the alarm for the U-level anti-tampering.	One-way message
View Device Information	The MQTT server sends a request to the V5008 gateway to query the network parameters, firmware version number, and U-level master module firmware version number of the V5008 gateway.	One-way message
Noise	Collect noise data. When the noise value changes by more than 5 dB, the V5008 AIoT gateway actively reports the noise value information.	Bidirectional message

5.2. Differences in networking protocols between C68 and C60

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extended module	item	Function description
C60	No-address	When C60 is networked, C60 has no address. Therefore, in the subsequent protocol, the "U-level master module RS485 address/C68 module RS485 address" mentioned therein refers to the RS485 address of the U-level master module RS485 address.
	No ID	When C60 is networked, C60 has no ID, then in the following protocol, the "U-level master module ID / C68 module ID" mentioned therein refers to the U-level master module ID.
C68	Have address	When C68 is networked, C68 has an address, then in the subsequent protocol, the "U-level master module RS485 address/C68 module RS485 address" mentioned therein refers to C68 module RS485 address. In terms of physical connection, U-level master module RS485 address is consistent with C68 module RS485 address.
	Have ID	When C68 is set up, C68 has an ID, then in the subsequent protocol, the phrase "U-level master module ID / C68 module ID" refers to the C68 module ID.

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5.3. Heartbeat Packet

- **functional description**

The V5008 gateway sends heartbeat packets to the MQTT server at 60-second intervals. At the same time, when the U-level module is online or when the total number of U-levels changes, it will report the information in an event-triggered manner.

- **Transmission direction (One-way message)**

Publisher: AIoT gateway

Receiver: MQTT server

Subscriber: Service platform

- **topic**

request：none

Response：V5008Upload/Gateway ID /OpeAck

- **data frame format：**

request：none

request：

Data frame field	number of bytes	Function description	Multiple sets of data explanations
0xCC 或 0xCB	1byte	0xCC represents the heartbeat packet; When a U-level module is online or the total number of U-level modules changes, it is 0xCB. Explanation of the response mechanism: 0xCC: Report once every minute; 0xCB: Triggered by events (when a U-level module is online or the total number changes).	
U-level master module RS485 address/C68 module RS485	1byte	The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.	Each group consists of 6 bytes, corresponding

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address			to 1 U-level master module. There are a total of 10 groups. When the RS485 address is not in use, the data is 0X00.
U-level master module ID / C68 module ID	4bytes	The C60 networking is based on the U-level master module ID , while the C68 networking is based on the C68 module ID. Please refer to Chapter 5.2 for details.	
U-level module, U-level number	1byte	The total number of U-level for each U-level module can reach up to 54U.	
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.	

- **examples**

request：none

Response：CC（or CB）0100 0000 0000 0200 0000 0000 0300 0000 0000 0400 0000 0000 0530 BEBE 2C 0600 0000 0000 0700 0000 0000 0800 0000 0000 0900 0000 0000 0A00 0000 0000 0001 1234

5.4. Asset data

- **Function Description**

The MQTT server supports active query of asset data. Meanwhile, the V5008 gateway will push real-time change information when the asset tags are removed or replaced. When the anti-theft tag of the U-level asset is torn off, the V5008 gateway will also push the latest change information in real time.

- **Transmission direction(Bidirectional message)**

Publisher: AIoT gateway ; Service platform

Receiver: MQTT server

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Subscriber: Service platform; AIoT gateway

- **topic：**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /LabelState

- **data frame format：**

  request：

Data frame field	number of bytes	Function description
0xE901	2bytes	Obtain the information of the U-level tag
U-level master module RS485 address/C68 module RS485 address	1byte	Obtain the information of the designated U-level tag based on the RS485 address. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.

Response：

Data frame field	number of bytes	Function description	Multiple sets of data explanations
0xBB	1byte	Respond to the information of the U-level tag	
U-level master module RS485 address/C68 module RS485 address	1byte	Respond to the U-level tag information of the specified address The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.	
U-level master module ID / C68	4bytes	The C60 networking is based on the U-level master module ID , while the C68 networking	

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module ID		is based on the C68 module ID. Please refer to Chapter 5.2 for details.	
reserved	1byte	Reserved	
Total number of U-levels	1byte	The total number of U-bays in this module is 54, which is the maximum supported capacity.	
Number of online tags	1byte	How many online tags are currently present on this group of U-level modules?	
U-Level number	1byte	The serial number of the U-level on the U module (ranging from 1 to 54), please refer to the definition of the term for details.	Each group consists of 6 bytes, corresponding to one online tag. The total number of groups is equal to the number of online tags.
Is there any alarm?	1byte	An alarm will be triggered only when the tamper-proof tag is damaged (0x01 indicates an alarm), while no alarm will occur when other tags and the tamper-proof tag are in normal condition (0x00 indicates normal).	
Tag ID	4bytes	The online tags placed on the number U have unique IDs, and each ID is distinct.	
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.	

- **examples**

  request：E90101

  Response：BB 01 30BEBE2C 00 2A 01 04 00 21B2ACC1 0001 1234

5.5. Temperature and Humidity

- **Function Description**

The MQTT server supports active query of temperature and humidity data. Meanwhile, when the temperature and humidity changes exceed the threshold (±0.5℃/±1%RH), the

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V5008 gateway will automatically report the latest data.

- **Transmission direction(Bidirectional message)**

  Publisher: AIoT gateway;Service platform

  Receiver: MQTT server

  Subscriber: Service platform;AIoT gateway

- **topic**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /TemHum

- **data frame format**

  request：

Data frame field	number of bytes	Function description
0xE902	2byte	Obtain temperature and humidity data
U-level master module RS485 address/C68 module RS485 address	1byte	Obtain the temperature and humidity data of the specified U-level module based on the RS485 address. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.

Response：

Data frame field	number of bytes	Function description	Multiple sets of data explanations
U-level master module RS485 address/C68 module RS485 address	1byte	Respond to the temperature and humidity data under the specified U-level module. When the V5008 firmware version is for a direct gateway, the display shows 00. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details,	

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		please refer to Chapter 5.2.	
U-level master module ID / C68 module ID	4bytes	When the firmware version of V5008 is for direct connection gateway, the data displayed is 00 00 00 00. The C60 networking is based on the U-level master module ID , while the C68 networking is based on the C68 module ID. Please refer to Chapter 5.2 for details.	
Temperature and humidity monitoring module RS485 address	1byte	Maximum support for 6 temperature and humidity sensors, address range: 10 - 15	Each group consists of 5 bytes, corresponding to 1 temperature and humidity monitoring module. There are a total of 6 groups (6 temperature and humidity monitoring modules).
Temperature	2bytes	Integer part of temperature (1 byte) + Decimal part of temperature (1 byte)	
humidity	2bytes	The integer part of humidity (1 byte) + the decimal part (1 byte)	
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.	

- **note**

The RS485 address of the humidity and temperature monitoring module is marked on the hardware label. Each group of U-level modules can support up to 6 modules (address range: 0x0A to 0x0F, corresponding to decimal 10 to 15).

- **examples**

request：E90206

Response：0630BEBE2C 0A1E02320F 0B00000000 0C00000000 0D00000000 0E00000000 0F00000000 0001 1234

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5.6. Door Status

- **Function Description**

The MQTT server can query the status of the door, and at the same time, the V5008 gateway will report the door status changes in real time.

- **Transmission direction(Bidirectional message)**

Publisher: AIoT gateway;Service platform

Receiver: MQTT server

Subscriber: Service platform;AIoT gateway

- **topic：**

request：V5008Download/Gateway ID

Response：V5008Upload/Gateway ID /OpeAck

- **data frame format：**

request：

Data frame field	number of bytes	Function description
0xE903	2bytes	Obtain the door status data
U-level master module RS485 address/C68 module RS485 address	1byte	Obtain the door status data of the specified U-level module based on the RS485 address. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.

Response：

Data frame field	number of bytes	Function description

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0xBA	1byte	Response to the door status data. When the V5008 firmware version is for a direct connection gateway, the data shows 00.
U-level master module RS485 address/C68 module RS485 address	1byte	Respond to the door status data under the specified U-level module. When the V5008 firmware version is for the direct connection gateway, the displayed data is 00 00 00 00. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.
U-level master module ID / C68 module ID	4bytes	The C60 networking is based on the U-level master module ID , while the C68 networking is based on the C68 module ID. Please refer to Chapter 5.2 for details.
Door status data	1byte	1. Single Infrared Door Magnetic Sensor - Door Status Data Definition: 0x01 indicates the door is open, 0x00 indicates the door is closed. If no infrared door magnetic sensor is installed, it defaults to 0x01. 2. Dual Infrared Door Magnetic Sensor - Door Status Data Definition: 0x11 (decimal 17): indicates the front door is open and the rear door is open; 0x01 (decimal 1): indicates the front door is closed and the rear door is open; 0x10 (decimal 16): indicates the front door is open and the rear door is closed; 0x00 (decimal 0): indicates the front door is closed and the rear door is closed. If no infrared door magnetic sensor is installed, the door status data is 0x11.
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers.

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		This field is only available in Gateway versions 2507101020 and later.

- **examples：**

  request：E90306

  Response： BA 06 30BEBE2C 01 0001 1234

  Door magnet usage tip⚠: There is an indicator light on the side of the door magnet. When the door is open, the light will be green and when the door is closed, the light will go out. This can be used to determine the on/off status of the door magnet.

5.7. Set U-Level Indicator Light Color

- **Function Description**

The MQTT server sends instructions to the V5008 gateway, setting the color of the indicator lights.

- **Transmission direction(One-way message)**

  Publisher: Service platform

  Receiver: MQTT server

  Subscriber: AIoT gateway

- **topic**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /OpeAck

- **data frame format**

  request：

Data frame field	number of bytes	Function description	Multiple sets of data explanations
0xE1	1byte	Set the color of the U-level indicator light	
U-level master	1byte	Set the color of the U-level	

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module RS485 address/C68 module RS485 address		indicator light based on the RS485 address for that U-level module. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.	
U-Level number	1byte	The serial number of the U-level on the U module (ranging from 1 to 54), please refer to the definition of the term for details.	Each group consists of 2 bytes, corresponding to 1 U-level and color. The total number of groups is equal to the number of U-level that need to be set with colors. To set different colors for different U-level, simply configure the corresponding U-level number and color code one by one. For example, to set the colors of U-level numbers 1, 2, and 3: E101 0105 0205 0304; When the "U-level number" is 0xEF, the command will simultaneously set all U-level to the specified color.
Color code	1byte	The color codes can be found in "Appendix 2. U-level Indicator Light Color Code Table".	

Response：

Data frame field	**number of bytes**	**Function description**

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0xAA	1byte	Response command code
Gateway ID	4byte	Respond to which gateway is specified
if it is successful	1byte	0xA0 failed, 0xA1 succeeded
request message	Nbyte	The original content of the request message occupies as many characters as necessary.
Message identification number	4byte	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.

- **examples**

  request：E1060605

  Response：AA 12345678 A1 E1060605 0001 1234

5.8. Obtain the color of the U-level indicator light

- **Function Description**

The MQTT server sends a request to the V5008 gateway to obtain the color of the indicator light.

- **Transmission direction(One-way message)**

  Publisher: Service platform

  Receiver: MQTT server

  Subscriber: AIoT gateway

- **topic**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /OpeAck

- **data frame format**

  request：

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Data frame field	number of bytes	Function description
0xE4	1byte	Obtain the command line for the color of the U-level indicator light
U-level master module RS485 address/C68 module RS485 address	1byte	Obtain the color code of the U-level indicator for the specified U-level master-slave module based on the RS485 address. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.

Response：

Data frame field	number of bytes	Function description
0xAA	1byte	Response command code
Gateway ID	4bytes	Respond to which gateway is specified
if it is successful	1byte	Data acquisition at 0xA0 failed, while data acquisition at 0xA1 was successful.
request message	N bytes	N represents the original byte count of the request message.
The obtained color code	N bytes	N represents the total number of U-levels in the U-level master-slave module; The color codes of all U-levels on the U-level master-slave module are arranged from the initial U to the final U; The color codes can be found in "Appendix 2. U-level Indicator Light Color Code Table"
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4

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		bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.

- **examples**

  request：E401

  Response：AA 12345678 A1 E401 05 05 05 05 05 05 0001 1234

5.9. Clearing U-Level Tamper Alarms

- **Function Description**

The MQTT server issues an instruction to the V5008 gateway to cancel the alarm for the U-level anti-tampering.

- **Transmission direction(One-way message)**

  Publisher: Service platform

  Receiver: MQTT server

  Subscriber: AIoT gateway

- **topic**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /OpeAck

- **data frame format**

  request：

Data frame field	number of bytes	Function description
0xE2	1byte	Cancel the alarm for U-level anti-tampering
U-level master module RS485 address/C68 module RS485 address	1byte	Obtain the specified U-level module based on the RS485 address The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details,

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		please refer to Chapter 5.2.
U-level number	1byte	Release the designated U-level

Response：

Data frame field	**number of bytes**	**Function description**
0xAA	1byte	Response command code
Gateway ID	4bytes	Respond to which gateway is specified
if it is successful	1byte	0xA0 failed, 0xA1 succeeded
request message	N bytes	The original content of the request message occupies as many characters as necessary.
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.

- **examples**

request：E20606

Response：AA 12345678 A1 E20606 0001 1234

5.10. View Device Information

- **Function Description**

The MQTT server sends a request to the V5008 gateway to query the network parameters, firmware version number, and U-level master module firmware version number of the V5008 gateway.

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- **Transmission direction(One-way message)**

  Publisher: Service platform

  Receiver: MQTT server

  Subscriber: AIoT gateway

- **topic**

  request：V5008Download/Gateway ID

  Response：V5008Upload/Gateway ID /OpeAck

- **data frame format**

  request：

Data frame field	number of bytes	Function description
0xEF	1byte	Check device information
0x01 or 0x02	1byte	0x01 Obtain network parameters and firmware version number, 0x02 Obtain firmware version number of U module
0x00	1byte	Fixed value 00

Response EF01：

Data frame field	number of bytes	Function description
0xEF	1byte	Response command code
0x01	1byte	Response 0x01: Obtain network parameters and firmware version number
product model	2bytes	Indicating the V5008 product
Gateway firmware version number	4bytes	The firmware version number of the gateway is named according to the year, month, day, hour and minute.
Device IP	4bytes	The current IP address of the V5008 gateway

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subnet mask	4bytes	The current subnet mask of the V5008 gateway
default gateway	4bytes	Default Gateway
MAC address	6bytes	The hardware MAC address of the V5008 gateway device
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.

Response EF02：

Data frame field	**number of bytes**	**Function description**	**Multiple sets of data explanations**
0xEF	1byte	Response command code	
0x02	1byte	Response 02: Obtain the firmware version number of the U-level master module	
U-level master module RS485 address/C68 module RS485 address	1byte	respond which U-level module The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.	Each group consists of 5 bytes, corresponding to 1 U-level master module. The total number of groups is equal to the number of online U-level master modules.
Version number of the master module of U-level	4bytes	The firmware version number of the master module of U-level	
Message identification	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The	

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number		message identification number is used for the high-availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.	

- **examples**

request：EF0100

Response：EF01 1390 7D88 9028 C0A86464 FFFF0000 C0A80001 088012345678 0001 1234

5.11. Noise(Applicable only to the noise version V5008)

- **Function Description**

Collect noise data. When the noise value changes by more than 5 dB, the V5008 AIoT gateway actively reports the noise value information.

- **Transmission direction(Bidirectional message)**

Publisher: AIoT gateway;Service platform

Receiver: MQTT server

Subscriber: Service platform;AIoT gateway

- **topic**

request：V5008Download/Gateway ID

Response：V5008Upload/Gateway ID /Noise

- **data frame format**

request：

Data frame field	number of bytes	Function description
0xE904	2byte	Obtain the noise value data
U-level master module	1byte	Obtain the noise value data based on the RS485 address

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RS485 address/C68 module RS485 address		The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.

Response：

Data frame field	number of bytes	Function description	Multiple sets of data explanations
U-level master module RS485 address/C68 module RS485 address	1byte	Respond to the noise data under the specified U-level module. The C60 networking is based on the U-level master module RS485 address, while the C68 networking is based on the C68 module RS485 address. For details, please refer to Chapter 5.2.	
U-level master module ID / C68 module ID	4bytes	The C60 networking is based on the U-level master module ID , while the C68 networking is based on the C68 module ID. Please refer to Chapter 5.2 for details.	
Noise monitoring module RS485 address	1byte	The maximum support for 3 noise monitoring modules, with their addresses being: 16, 17, 18.	Each group consists of 5 bytes, corresponding to 1 Noise monitoring module . There are a total of 3 groups (3 Noise monitoring module).
noise value	2bytes	Convert from big-endian data storage format to float data type	
Message identification number	4bytes	Multiple MQTT server cluster platforms determine whether the message has been consumed. The message identification number is used for the high-	

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		availability cluster MQTT servers, and the 4 bytes are random numbers. This field is only available in Gateway versions 2507101020 and later.	

- **note**

The RS485 address of the noise monitoring module is marked on the hardware label. Each group of U-level modules can support up to 3 modules (address range: 0x10 to 0x12, corresponding to decimal 16 to 18).

- **examples**

request：E90402

Response：020630BEBE2C 10 423628A4 11 00000000 12 00000000 0001 1234

Response data parsing: 0x10: Noise monitoring module RS485 address (converted to decimal equals 16), 0x42 0x36 0x28 0xA4 are four bytes, converted to float data type in big-endian data storage format equals 45.54db.

Appendix 1. Three U-level indicator light modes

U-level light mode: 1. Trigger mode, 2. Blinking mode, 3. Off mode

1) Trigger Mode

1. Trigger Mode: After maintaining a constant bright state for 60 seconds, it will automatically switch to the breathing light mode; when it detects the operation of placing or removing the label, it will trigger a 60-second constant bright state again and enter the breathing light cycle; otherwise, it will maintain the breathing light state continuously.

2. The trigger mode rhythm is as shown in the following figure: it remains on for 60 seconds, then enters the breathing light cycle (4 seconds gradual dimming → 3 seconds off → 4 seconds gradual brightening), with a complete cycle of 11 seconds and repeated execution.

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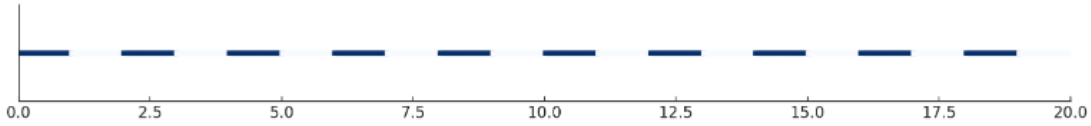
2) Blinking Mode

Blinking Mode: The light is on for 1 second, then off for 1 second.

The rhythm of the blinking light is as shown in the following diagram: The light cycles on and off in a 2-second interval (1 second on, 1 second off).



3) Off mode

When the U-level indicator is set to the off mode, the tag will automatically enter the off state after a 2-second purple flashing when it is placed on the shelf.

Additional Explanation:

1. By default (if the service platform has not issued the "Set U-level Indicator Light Color" instruction), the U-level light on the tag is in blue trigger mode, and the U-level light on the tag will go off when there is no tag.

2. If the service platform has issued the "Set U-level Indicator Light Color" instruction, when the tag is placed, it will first flash purple for 2 seconds, and then enter the corresponding light mode.

Appendix 2: U-Level Indicator Light Color Code Table

Color	Value	Light mode
Turn off	0	Off mode
Red	1	Trigger mode
Purple	2	
Yellow	3	

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Green	4	
Cyan	5	
Blue	6	
Red flashing	8	Blinking mode
Purple flashing	9	
Yellow flashing	10	
Green flashing	11	
Cyan flashing	12	
Blue flashing	13	

1) When the service platform issues the instruction "Set the color of the U-level indicator light" and the color code value is "0", the U-level light enters the off mode.

2) When the service platform issues the instruction "Set the color of the U-level indicator light" and the color code value is "1 to 7", the U-level light enters the trigger mode.

3) When the service platform issues the instruction "Set the color of the U-level indicator light" and the color code value is "8 to 14", the U-level light enters the flashing mode.

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