Gateway with public MQTT Protocol

1. General principles

This Protocol follows principles:

1. Topic hierarchy should not be too many
2. The topic length should be as short as possible
3. Data Point table key length should be as short as possible
4. Data is transmitted incrementally
5. The overall JSON format should be as uniform as possible.
6. The topic contains the unique identifier of the device, and changing the identifier can be the main unique identifier.
7. Support device reset, restart, remote upgrade, file download and other functions
8. The message has a unique code and can also be auto-incremented, which is convenient for locating Packet loss problems.
9. The software version, hardware version, version date, device model and other parameters are provided in the communication message
10. The main device supports its own Data Point transmission
11. The main device supports a message body that can transmit data points to multiple sub-devices.
12. Device model using enterprise standard string

2. Introduction of topics and information

2.1 topic

The topic consists of four parts

```JSON
dev/gw/{did}/ota/set
```

Dev is used to isolate and identify device data

Did is the unique code for the device in the cloud

Ota identifies the data field to which it belongs, including ota, list, point, rule.

Set is used to identify behaviors, including set, get, report, add, del, setack, getack, addack, delack.

1. OTA

```JSON
publish: dev/gw/{did}/ota/setack
subscribe: dev/gw/{did}/ota/set
```

2. Device list

```Bash
publish: dev/gw/{did}/list/{report|getack|delack|addack}
subscribe: dev/gw/{did}/list/{get|add|del}
```

3. Equipment Data Point

```JSON
publish: dev/gw/{did}/point/{report|getack}
subscribe: dev/gw/{did}/point/{get|set}
```

4. Equipment automation

```JSON
publish: dev/gw/{did}/rule/{getack|addack|delack}
subscribe: dev/gw/{did}/rule/{get|add|del}
```

5. Model operation

```JSON
publish: dev/gw/{did}/model/{getack|setack|delack}
subscribe: dev/gw/{did}/model/{get|set|del}
```

6. RS-485 transparent transmission

```JSON
publish: dev/gw/{did}/rs485/setack
subscribe: dev/gw/{did}/rs485/set
```

2.2 Messages

Sub-device data is sent and received by the master device, which is at the same level as the sub-device and has its own Data Point. Version number, model, etc. are not included in the Data Point.

Each message contains msgid and time. msgid is a string type that can be incremented or random; time is a numerical value that represents the current time in ms.

2.3 OTA

OTA supports devices and gateways. Please upgrade and upgrade the gateway according to the OTA related topics according to the device type.

2.4 Device list

The device list contains all devices under the gateway, and the device list contains the device Unique Device Identifier. In the open protocol gateway, the Unique Device Identifier is device {did}.

When reading or writing the device list, the gateway device is not in the list.

When reading and writing the device point table and OTA, the gateway device is in the list item.

2.5 Device Data Points

The device Data Point is specified by the device description file and imported through the gateway's built-in web page.

2.6 Automation

Automation is used for local control and can be added externally. The supported types of automation are as follows:

1. Cron Time Task

The time benchmark is the UTC time given by the time server set by the user. It supports cron expressions in the form of year, month, day, week, hour, minute, and second to set the time, with an accuracy of 1 second. It supports the Wildcard function of cron expressions. The task objectives include reading and writing.

2.7 Model operation

The model operation is used for remote updating, remote viewing, and remote deletion of device model files in the gateway.

2.8 RS-485 transparent transmission

Transparent transmission is used for remote device debugging and can transmit ModbusRTU original data source frames.

3. Information format

3.1 OTA launch

Topic：

dev/gw/{did}/ota/set

Payload:

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "data" :{
        "devs" : [
            {
                "did": "0107010E4C5400000966",
                "ota" : {
                    "url": "http://terminalbox.oss-cn-
hangzhou.aliyuncs.com/OpenGW.bin",
                    "sver":"V1.0.0",
                    "md5": "281094f347571c240bc7d92a49c9f7d4"
                }
            }
        ]
    }
}
```

Note: OTA upgrade gateway needs to upgrade the file on the file server, the file download url to the gateway

3.2 OTA response

Topic:

dev/gw/{did}/ota/setack

Payload:

```
JSON
{
        "msgid": "1222222",
        "time": 1713145069852,
        "devs": [{
                "did": "0107010E4C5400000966",
                "ota": {
                        "url": "http://terminalbox.oss-cn-
hangzhou.aliyuncs.com/OpenGW.bin",
                        "sver": "V1.0.0",
                        "status": "success",
                        "error_code": 0
```

```
                }
        }]
}
```

3.3 Obtaining device list

Topic:

dev/gw/{did}/list/get

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "cnt" : 2,
        "offset" : 0
    }
}
```

3.4 Obtain response from device list

The directly connected device returns empty.

Topic:

dev/gw/{did}/list/getack

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "cnt" : 2,// Number of returned devices
        "offset" : 0, // Offset of the returned device list
        "mxcnt" : 2,// Total number of devices connected to the gateway
        "devs" :[
            {
          "did" : "01040333221204000009",
          "model" : "01040333",
          "type" : "modbus",
```

```
          "sver" : "V4.14",
          "hver" : "V0.99",
          "mac" : "e6:e0:cd:dc:6b:3b",
          "modbus" : {
            "num" : 0,
            "addr" : 100,
            "port" : 1,
            "baud_rate" : 19200,
            "parity" : 2,
            "data_bits" : 3,
            "stop_bits" : 1
          }
        },
           {
          "did" : "01040335210908000035",
          "model" : "01040335",
          "type" : "modbus",
          "sver" : "V4.14",
          "hver" : "V1.1",
          "mac" : "f6:e9:a1:8b:05:cb",
          "modbus" : {
            "num" : 1,
            "addr" : 101,
            "port" : 1,
            "baud_rate" : 19200,
            "parity" : 2,
            "data_bits" : 3,
            "stop_bits" : 1
          }
        }
        ]
    }
}
```

3.5 Equipment addition

Topic：

dev/gw/{did}/list/add

Payload related parameters:

1. Act: Add mode, support manual and automatic

Add manually:

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Manually add the parameters required by the sub-devices to help the gateway connect to the sub-devices. This process does not require the gateway to perform self-discovery.

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "act" : "manual",
        "devs" :[
            {
          "did" : "01040333221204000009",
          "model" : "01040333",
          "type" : "modbus",
          "sver" : "V4.14",
          "hver" : "V0.99",
          "mac" : "e6:e0:cd:dc:6b:3b",
          "modbus" : {
            "num" : 0,
            "addr" : 100,
            "port" : 1,
            "baud_rate" : 19200,
            "parity" : 2,
            "data_bits" : 3,
            "stop_bits" : 1
          }
        },
           {
          "did" : "01040335210908000035",
          "model" : "01040335",
          "type" : "modbus",
          "sver" : "V4.14",
          "hver" : "V1.1",
          "mac" : "f6:e9:a1:8b:05:cb",
          "modbus" : {
            "num" : 1,
            "addr" : 101,
            "port" : 1,
            "baud_rate" : 19200,
            "parity" : 2,
            "data_bits" : 3,
            "stop_bits" : 1
          }
        }
```

```
        ]
    }
}
```

Automatically add:

The gateway discovers and automatically adds devices based on their model and quantity. When the model and quantity are not provided, the gateway decides the type and quantity to add.

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "act" : "auto"
    }
}
```

3.6 Device Adding Feedback

Topic:

dev/gw/{did}/list/addack

Payload: Add feedback manually

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "act" : "manual",
        "devs" :[
           {
          "did" : "01040333221204000009",
          "type" : "modbus",
          "status" : "added"          // have already added
        },
           {
          "did" : "01040335210908000035",
          "type" : "modbus",
          "status" : "duplicate"      //  duplicate, devices with the same did exist under the gateway, no need to add
        }
        ]
```

```
    }
}
```

Payload: Automatically add feedback (Note: Automatically add devices takes about 1 minute, and the gateway restarts after adding)

```JSON
{
  "msgid" : "1222222",
  "time" : 1712989935407,
  "list" : {
    "act" : "auto",
    "set" : "OK"
  }
}
```

3.7 Device deletion

Topic:

dev/gw/{did}/list/del

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "act" : "del",
        "devs" :[
            {"did": "01040333221204000009","type": "modbus"},
            {"did": "01040333221204000010","type": "modbus"},
            {"did": "01040335210908000035","type": "modbus"}
        ]
    }
}
```

3.8 Device deletion feedback

Topic:

dev/gw/{did}/list/delack

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "list" : {
        "act" : "del",
        "devs" :[
            {
                "did": "01040333221204000009",
                "status" : "deleted"          // already deleted
            },
            {
                "did": "01040333221204000010",
                "status" : "not exist"        // The did device to be deleted does not exist
            },
            {
                "did": "01040335210908000035",
                "status" : "failed"           // fail to delete
            }
        ]
    }
}
```

3.9 Equipment point table value acquisition

Default embedded device point table.

default.chintm

```
encoding:UTF-8
name:010403XX
model:NB2-V5
protl:modbus-rtu
ver:1.2.0
dver:1.0.0
// key;datatype;regaddr;regcnt;func;map;start bit;bit len;unit;endian;endianness;timeout;point interval;shadow flow rank;shadow flow percent;shadow threshold;shadow read mode;shadow trigger reg;
-
```

```
error;enum16;0021;1;[03,00];[0:0,1:1,2:2,4:3,8:4,10:5,20:6,40:7,80
:8,100:9,400:A,800:B,1000:C];0;13;1;0;0;500;10;1;5;;;[0023,0200,02
A0];
-
swStat;enum16;0020;1;[03,00];[0:0,1:1];7;1;1;0;0;500;10;1;5;;1;[04
00];
-
VErrorLock;enum16;0020;1;[03,00];[0:0,1:1];8;1;1;0;0;500;10;1;5;;1
;;
-
RemoteLock;enum16;0020;1;[03,00];[0:0,1:1];10;1;1;0;0;500;10;1;5;;
1;;
- model;enum16;0020;1;[03,00];[0:0,1:1];11;1;1;0;0;500;10;1;5;;1;;
- ChangeR;u16;0400;1;[03,00];;;;1;0;0;500;10;;;;1;;
- ChangeT;datetime;0401;3;[03,00];;;;1;0;0;500;10;;;;1;;
- CaliTime;datetime;0000;4;[00,10];;;;1;0;0;500;10;;;;;;
-
Ctrl;enum16;0000;1;[00,10];[7:1,6:2,2:3,E:4,10:5];;;1;0;0;500;10;;
;;;;
- Ia;u32;0040;2;[03,00];;;;0.001;0;0;500;10;4;;;1;;
- Ib;u32;0042;2;[03,00];;;;0.001;0;0;500;10;4;;;1;;
- Ic;u32;0044;2;[03,00];;;;0.001;0;0;500;10;4;;;1;;
- Reserved1;u32;0046;2;[03,00];;;;0.001;0;0;500;10;4;;;1;;
- Ua;u16;0048;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- Ub;u16;0049;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- Uc;u16;004A;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- Reserved2;u16;004B;3;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- PFt;i16;004E;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- Fre;u16;004F;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- Id;u16;0050;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- Pa;i32;0051;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Pb;i32;0053;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Pc;i32;0055;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Pt;u32;0057;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- elec;i32;0059;2;[03,00];;;;1;0;0;500;10;4;;;1;;
- Relec;i32;005B;2;[03,00];;;;1;0;0;500;10;4;;;1;;
- Selec;i32;005D;2;[03,00];;;;1;0;0;500;10;4;;;1;;
- Qa;i32;005F;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Qb;i32;0061;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Qc;i32;0063;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Qt;i32;0065;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Sa;i32;0067;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Sb;i32;0069;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- Sc;i32;006B;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
```

```
- St;i32;006D;2;[03,00];;;;0.1;0;0;500;10;4;;;1;;
- PFa;i16;006F;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- PFb;i16;0070;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- PFc;i16;0071;1;[03,00];;;;0.01;0;0;500;10;4;;;1;;
- TempChip;i16;0003;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempInA;i16;0004;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempInB;i16;0005;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempInC;i16;0006;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempInN;i16;0007;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempOutA;i16;0008;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempOutB;i16;0009;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempOutC;i16;000A;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- TempOutN;i16;000B;1;[03,00];;;;1;0;0;500;10;4;;;1;;
- EUa;u16;0023;1;[03,00];;;;0.01;0;0;500;10;;;;1;;
- EUb;u16;0024;1;[03,00];;;;0.01;0;0;500;10;;;;1;;
- EUc;u16;0025;1;[03,00];;;;0.01;0;0;500;10;;;;1;;
- EIa;u16;0026;2;[03,00];;;;0.001;0;0;500;10;;;;1;;
- EIb;u16;0028;2;[03,00];;;;0.001;0;0;500;10;;;;1;;
- EIc;u16;002A;2;[03,00];;;;0.001;0;0;500;10;;;;1;;
- EId;u16;002C;1;[03,00];;;;1;0;0;500;10;;;;1;;
- EFre;i16;002D;1;[03,00];;;;0.01;0;0;500;10;;;;1;;
- ETemp;u16;002E;1;[03,00];;;;1;0;0;500;10;;;;1;;
-
EventR;enum16;0200;1;[03,00];[0:0,2:1,4:2,8:3,10:4,20:5,40:6,80:7,
100:8,200:9,400:A,800:B,1000:C,2000:D,4000:E];0;15;1;0;0;500;10;;;
;1;;
- EventT;datetime;0201;3;[03,00];;;;1;0;0;500;10;;;;1;;
- EventS;u16;0204;1;[03,00];;;;1;0;0;500;10;;;;1;;
- Life;u32;02A0;2;[03,00];;;;1;0;0;500;10;;;;1;;
- LeakLife;u32;02A2;2;[03,00];;;;1;0;0;500;10;;;;1;;
```

Field name	Identifier	Remarks	Unit	Priority	Percentage change
Fault condition	error	Status (0: normal, 1: overvoltage, 2: undervoltage, 3: leakage, 4: overload, 5: reserved, 6: temperature, 7: phase failure, 8: overfrequency,		1	5

		9: underfrequency, 10: reserved, 11: button jump, 12: remote jump, 13: power limited)			
On-off state	swStat	*Status (0: Open, 1: Close)*		1	5
Over-Under voltage deadlock	VErrorLock	*Status (0: did not occur, 1: occurred)*		1	5
Remote lock	RemoteLock	*Status (0: Unlocked, 1: Locked)*		1	5
Manual automatic mode	model	*0: Automatic Mode 1: Manual Mode*		1	5
Cause of displacement	ChangeR				
Displacement time	ChangeT	6-Stage: year, month, day, hour, minute, second			

School time	CaliTime	Data Point Settings
		{
		"k": "CaliTime",
		"v": 1
		}
		The gateway uses its own time to time the device			

A-phase current	Ia		A	4	0
B-phase current	Ib		A	4	0
C-phase current	Ic		A	4	0

Doro Tang 6671

Retain 1	Reserved 1	Used to keep the address continuous		4	0
A-phase voltage	Ua		V	4	0
B-phase voltage	Ub		V	4	0
C-phase voltage	Uc		V	4	0
Retain two	Reserved 2	Used to keep the address continuous		4	0
Total power factor	PFt			4	0
Frequency	Fre		Hz	4	0
Residual current	Id		mA	4	0
Phase A active power	Pa		W	4	0
B-phase active power	Pb		W	4	0
C-phase active power	Pc		W	4	0
Total active power	Pt		W	4	0
Total active	elec		W·h	4	0

Doro Tang 6671

energy					
Total reactive energy	Relec		varh	4	0
Total apparent electrical energy	Selec		VAh	4	0
A-phase reactive power	Qa		var	4	0
B-phase reactive power	Qb		var	4	0
C-phase reactive power	Qc		var	4	0
Total reactive power	Qt		var	4	0
A apparent power	Sa		VA	4	0
B phase apparent power	Sb		VA	4	0
C phase apparent power	Sc		VA	4	0
Total apparent power	St		VA	4	0
A-phase	PFa			4	0

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power factor					
B-phase power factor	PFb			4	0
C-phase power factor	PFc			4	0
Chip temperature	TempChip		℃	4	0
A-phase inlet temperature	TempInA	Only for newer versions NB2 with terminal temperature measurement function, which still under development	℃	4	0
B-phase inlet temperature	TempInB		℃	4	0
C-phase inlet temperature	TempInC		℃	4	0
N-phase inlet temperature	TempInN		℃	4	0
Phase A outlet temperature	TempOutA		℃	4	0
B-phase outlet temperature	TempOutB		℃	4	0

Doro Tang 6671

C-phase outlet temperature	TempOutC		℃	4	0
N-phase outlet temperature	TempOutN		℃	4	0
A-phase voltage at fault	EUa		V		
B-phase voltage at fault	EUb		V		
C-phase voltage at fault	EUc		V		
A-phase current at fault	EIa		A		
B-phase current at fault	EIb		A		
C-phase current at fault	EIc		A		
Leakage current at fault	EId		mA		
Frequency at fault	EFre		Hz		
Temperature at fault	ETemp		℃		

Doro Tang 6671

Cause of failure	EventR	Status (0: normal, 1: overload, 2: overvoltage, 3: undervoltage, 4: remote switch, 5: leakage current, 6: phase failure, 7: manual switch, 8: overfrequency, 9: underfrequency, 10: reserved, 11: temperature, 12: reserved, 13: button jump, 14: remote jump, 15: power limited)			
Time of failure	EventT	6-Stage: year, month, day, hour, minute, second			
State at fault	EventS				
Lifespan	Life	Each time the switch is opened, the lifespan increases by 1.	Unit: times		
Leakage life	LeakLife	Every time a leakage tripping occurs, the service life increases by 1. Only leakage models are supported	Unit: times		
Open and close control	Ctrl	1: Open switch 2: Closing 3: Unlock 4: Flashing light 5: Deadlock			

Note: By default, the level 1 data change% 5 in the embedded device point table is reported, the level 4 data is collected and reported in a default cycle of 1 minute, and the level 4 Data Acquisition cycle is 1~ 60 minutes. It can be configured through the remote gateway Data Point (general_cycle) or the web page General Data Read Cycle (min) to take effect after restarting.

Topic:

dev/gw/{did}/point/get

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "point" : {
        "devs": [
            {
                "did": "01040333221204000009",
                "points": [
                    {"k": "Ua"},
                    {"k": "Ub"}
                ]
            },
            {
                "did": "01040335210908000035",
                "points": [
                    {"k": "Ua"},
                    {"k": "Ub"}
                ]
            }
        ]
    }
}
```

3.10 Equipment point table value acquisition response | Equipment point table value reporting

Topic:

dev/gw/{did}/point/{getack|report}

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "point" : {
        "devs": [
            {
                "did": "01040333221204000009",
                "online" : 1,
                "points": [
                    {
```

```
                        "k": "Ua",
                        "v" : 1233 // The data point was obtained
successfully, fill in the obtained data
                    },
                    {
                        "k": "Ub",
                        "v" : 1233 // The data point was obtained
successfully, fill in the obtained data
                    }
                ]
            },
            {
                "did": "01040335210908000035",
                "online" : 0,
                "points": [
                    {
                        "k" : "Ua",
                        "v" : null // Failed to set the data, fill in the null in
JSON
                    },
                    {
                        "k" : null, //  Failed to lookup the key, fill in the
null in JSON
                        "v" : null // Failed to obtain the data, fill in the
null in JSON
                    }
                ]
            }
        ]
    }
}
```

3.11 Device point table value setting

Topic:

dev/gw/{did}/point/set

Payload:

```
JSON
{
    "msgid": "1222222",
```

```
    "time": 1234345454,
    "point" : {
        "devs": [
            {
                "did": "01040333221204000009",
                "points": [
                    {"k": "Ctrl", "v" : 3},
                    {"k": "Ctrl", "v" : 1}
                ]
            },
            {
                "did": "01040335210908000035",
                "points": [
                    {"k": "Ctrl", "v" : 3},
                    {"k": "Ctrl", "v" : 2}
                ]
            }
        ]
    }
}
```

3.12 Equipment point table value setting response

Topic:

dev/gw/{did}/point/setack

Payload:

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "point" : {
        "devs": [
            {
                "did": "01040333221204000009",
                "online":1,                    // Online status: 1: online, 0: offline
                "points": [
                    {
                        "k": "Ctrl",
                        "v" : 3              // The data point is successfully set, Fill in the set value
                    },
```

```
                    {
                        "k": "Ctrl",
                        "v" : 1             // The data point is
successfully set, Fill in the set value
                    }
                ]
            },
            {
                "did": "01040335210908000035",
                "online":0,                 // Online status: 1: online, 0:
offline
                "points": [
                    {
                        "k" : "Ctrl",
                        "v" : null          // Failed to set the data, fill in
the null in JSON
                    },
                    {
                        "k" : null,         // Failed to lookup the key, fill
in the null in JSON
                        "v" : null          // Failed to set the data, fill in
the null in JSON
                    }
                ]
            }
        ]
    }
}
```

Doro Tang 6671

3.13 Automated acquisition

Topic:

dev/gw/{did}/rule/get

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "rule" : {
        "cnt" : 3,
```

```
        "offset" : 0
    }
}
```

3.14 Automated response acquisition

Topic:

dev/gw/{did}/rule/getack

Payload:

```JSON
{
  "msgid" : "1222222",
  "time" : 1712827530561,
  "rule" : {
    "cnt" : 3,
    "offset" : 0,
    "mxcnt" : 15,
    "rules" : [ {
      "did" : "01040333221204000009",
      "act" : [ {
        "id" : 1,
        "type" : "cron_w",
        "cron" : "0 * * * * ? ",
        "points" : [ {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        } ]
      }, {
        "id" : 2,
        "type" : "cron_w",
```

```
      "cron" : "30 * * * * ? ",
      "points" : [ {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 2
      } ]
    } ]
  }, {
    "did" : "01040333220614000016",
    "act" : [ {
      "id" : 1,
      "type" : "cron_w",
      "cron" : "1 * * * * ? ",
      "points" : [ {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 3
      }, {
        "k" : "Ctrl",
        "v" : 2
      } ]
    }, {
      "id" : 2,
      "type" : "cron_w",
      "cron" : "31 * * * * ? ",
```

```
        "points" : [ {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        } ]
      } ]
    }, {
      "did" : "01040333220614000025",
      "act" : [ {
        "id" : 1,
        "type" : "cron_w",
        "cron" : "2 * * * * ? ",
        "points" : [ {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        } ]
      }, {
        "id" : 2,
        "type" : "cron_w",
        "cron" : "32 * * * * ? ",
        "points" : [ {
```

```
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        } ]
      } ]
    } ]
  }
}
```

3.15 Automated Addition

Topic:

dev/gw/{did}/rule/add

Payload:

```JSON
{
  "msgid" : "1222222",
  "time" : 1234345454,
  "rule" : {
    "rules" : [ {
      "did" : "01040335210908000003",
      "act" : [ {
        "id" : 1,
        "type" : "cron_w",
        "cron" : "17 * * * * ? ",
        "points" : [{
          "k" : "Ctrl",
          "v" : 3
        },{
```

```
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        },{
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        }]
      }, {
        "id" : 2,
        "type" : "cron_w",
        "cron" : "47 * * * * ? ",
        "points" : [{
          "k" : "Ctrl",
          "v" : 3
        },{
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 3
        },{
          "k" : "Ctrl",
          "v" : 3
        }, {
          "k" : "Ctrl",
          "v" : 2
        }]
      } ]
    } ]
  }
}
```

3.16 Automated Add Response

Topic:

dev/gw/{did}/rule/addack

Payload:

Doro Tang 6671 Doro Tang 6671

```JSON
{
    "msgid": "1222222",
    "time": 1712827847118,
    "rule" : {
        "rules" :[
            {
                "did" : "01040335210908000003",
                "status" : "added"   // "rule did duplicate",
"failed"
            },
            {
                "did" : "01040333220614000025",
                "status" : "added"   // "rule did duplicate",
"failed"
            }
        ]
    }
}
```

Doro Tang 6671 Doro Tang 6671

3.17 Automated Deletion

Topic:

dev/gw/{did}/rule/del

Payload:

```JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "rule" : {
        "rules" :[
            {
                "did" : "01040335210908000003"
            },
            {
                "did" : "01040333220614000025"
            }
        ]
    }
}
```

3.18 Automated deletion of responses

Topic:

dev/gw/{did}/rule/delack

Payload:

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "rule" : {
        "rules" :[
            {
                "did" : "01040335210908000003",
                "status" : "deleted"
            },
            {
                "did" : "01040333220614000025",
                "status" : "deleted"
            }
        ]
    }
}
```

3.19 Remote profile import model settings

Topic:

dev/gw/{did}/model/set

Payload:

```
JSON
{
        "msgid": "1222222",
        "time": 1234345454,
        "model": {
                "url": "http://terminalbox.oss-cn-
hangzhou.aliyuncs.com/NB2.chintm",
                "model_name": "NB2",
                "md5": "281094f347571c240bc7d92a49c9f7d4"
        }
```

```
}
```

Note: The model import gateway needs to put the file on the file server, and give the file download url and file MD5 check value to the gateway

3.20 Remote description file import model setting response

Topic:

dev/gw/{did}/model/setack

Payload:

```
JSON
{
        "msgid": "1222222",
        "time": 1234345454,
        "model": {
                "url": "http://terminalbox.oss-cn-
hangzhou.aliyuncs.com/NB2.chintm",
                "model_name": "NB2",
                "md5": "281094f347571c240bc7d92a49c9f7d4",
                "status": "success",
                "error_code": 0

        }
}
```

Error code	Value	Meaning	Field description
error_code	-4	File get wrong	File download failed.
	-3	File size wrong	File size allows **0~10K.**
	-2	File content wrong	File content **md5 check failed**.
	-1	The data point parse lines out of the limit	Data point line allows **[1,100]**.
	0	success	Right file

3.21 Obtaining remote model list

Topic:

dev/gw/{did}/model/get

Payload:

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "model" : {
        "cnt" : 3,
        "offset" : 0
    }
}
```

3.22 Get response for remote model list

Topic:

dev/gw/{did}/model/getack

Payload:

```
JSON
{
  "msgid" : "1222222",
  "time" : 1234345454,
  "model" : {
    "cnt" : 2,
    "offset" : 0,
    "mxcnt" : 2,
    "models" : [ "NB2.chintm", "01040359.chintm" ]
  }
}
```

3.23 Remote model deletion

Topic:

dev/gw/{did}/model/del

Payload:

```
JSON
```

```
{
    "msgid": "1222222",
    "time": 1234345454,
    "model" : {
        "del_models" :[
            {
                "file_name" : "NB2.chintm"
            },
            {
                "file_name" : "01040359.chintm"
            }
        ]
    }
}
```

3.24 Remote model deletion response

Topic:

dev/gw/{did}/model/delack

Payload:

```
JSON
{
    "msgid": "1222222",
    "time": 1234345454,
    "model" : {
        "del_models" :[
            {
                "file_name" : "NB2.chintm",
                "status" : "deleted" // Delete failed
            },
            {
                "file_name" : "01040359.chintm",
                "status" : "deleted" // Delete failed
            }
        ]
    }
}
```

3.25 Remote RS-485 Communication Setup

Topic:

dev/gw/{did}/rs485/set

Payload：

```
JSON
{
        "msgid": "1222222",
        "param": {   // If there are any parameters, the parameter
is used. If there are no parameters, the default value is 19200
even 1  timeout:1000 without CRC
                "port": {
                        "baud_rate": 19200,
                        "parity": 2,       //0:NONE     2:EVEN
3:ODD
                        "data_bits": 3,    //0:5_BITS   1:6_BITS
2:7_BITS  3:8_BITS
                        "stop_bits": 1     //1:BITS_1   2:BITS_1_5
3:BITS_2
                },
                "timeout": 1000,
                "crc16":1  //1:use CRC16，0:don’t use CRC16；CRC16
means that the CRC16 check is added by 2 bytes at the end of the
data
        },
        "485_send": "64 03 00 48 00 01"
}
```

3.26 Remote RS-485 Communication Setup Response

Topic：

dev/gw/{did}/rs485/setack

Payload：

Doro Tang 6671 Doro Tang 6671

```
JSON
{
        "msgid": "1222222",
        "param": {
                "port": {
                        "baud_rate": 19200,
                        "parity": 2,
                        "data_bits": 3,
                        "stop_bits": 1
                },
                "timeout": 1000,
```

```
                "crc16": 1
        },
        "485_send": "64 03 00 48 00 01",
        "485_recv": "64 03 02 61 8a 5c 7b"  // null: time limit
exceed
}
```

4. Equipment Point Table

4.1 Gateway point table

The gateway point table setting is mainly reflected in the connection parameter setting of the web page.

4.2 Gateway Remote Operable Data Point

Method: same as 3.9~ 3.12 device point table value operation, did can use the gateway did, k, v settings refer to the table below

Name (key)	Type	Meaning	Scope	Operation permissions
sver	string	Gateway software version number	Three-part version number	get
hver	string	Gateway hardware version number	Three-part version number	get
mac	string	Gateway MAC address	Hexadecimal format	get
mqtt_host_url	string	MQTT server address	Character length [0,100]	get/set
mqtt_client_id	string	MQTT User Identification	Character length [0,100]	get/set
mqtt_user_name	string	MQTT username	Character length [0,100]	get/set

mqtt_passwd	string	MQTT Password	Character length [0,100]	get/set
mqtt_port	number	MQTT port	[0,65535]	get/set
net_switch_config	number	Network handover configuration	Fixed value: Wi-Fi is the main feature, 4G is secondary 2: Wi-Fi only 4: Only 4G	get/set
wifi_this_ssid	string	Wi-Fi name	Character length [0, 32)	get/set
wifi_sta_pwd	string	Wi-Fi password	Character length [0, 32)	get/set
ntp_url	string	Gateway NTP timing server address, the gateway uses 3 timing addresses, the first 2 addresses are fixed, and the third address is configurable	Character length [0,100]	get/set
ping_addr	string	The address of the gateway ping is used to determine whether the extranet is reachable. This address needs to be configured when deploying a local area network	Character length [0,100]	get/set
ip_mode	number	IP mode: DHCP, STATIC (IP mode only	Fixed value: 1：DHCP	get/set

		applies to Wi-Fi)	2：STATIC	
ip_addr	string	IPV4 address in STATIC mode	Decimal dot fraction	get/set
subnet_mask	string	Subnet mask in STATIC mode	Decimal dot fraction	get/set
gateway	string	IP Gateway in STATIC mode	Decimal dot fraction	get/set
dns_addr	string	DNS address in STATIC mode	Decimal dot fraction	get/set
cur_ip_addr	string	IP Address currently being used by the Gateway	Decimal dot fraction	get
cur_subnet_mask	string	The subnet mask currently being used by the gateway	Decimal dot fraction	get
cur_gateway	string	The IP gateway currently being used by the gateway	Decimal dot fraction	get
general_cycle	number	Acquisition cycle of level 4 data in equipment description file	Unit: minutes Range: [1, 60]	get/set
reboot	number	Gateway restart	Fixed value: 1	set

4.3 Equipment Point Table

Refer to the default embedded device point table. When there is no device point table imported, use the gateway embedded point table: default.chintm

NB2 device common point table name (available for all NB2 devices): NB2.chintm.

Point table names of different device types in NB2 devices (specific to a class of devices with different widths and current specifications): 010403XX.chintm

5. Explanation of terms

Abbreviations	**Full name**	Explanation
k	key	Keymarks for Data Points
v	value	Values of Data Points
t	tag	Suffix of Data Point
msgid	Message id	Information uniquely identifies
time	timestamp	Timestamp
model		Equipment type, values refer to Chint Enterprise Standard
url	Uniform Resource Locator	Unified resource locator
sver	Software Version	Software version
hver	Hardware Version	Hardware version
acts	Actions	Action item set
mxcnt	Max cnt	Maximum number
cnt	cnt	Number
trigs	trigers	Trigger item collection
r	read	Read
w	write	Write
addack	Adding ack	Add a reply
getack	Get ack	Get a response
delack	Delete ack	Delete response
setack	Set ack	Set response
did	Serial number	The unique identification code of

		Chint smart devices is in the device QR code

Doro Tang 6671