TT18-4G-M MQTT Protocol v1.2

This TT18-4G MQTT protocol is command-response protocol. The TT18-4G publishes a data first, then the server subscribes this published data.

Publish topic: device / device ID / rx;
Subscribe topic: device / device ID / tx;
Note: The Publish topic and Subscribe topic can be customized.

Error code (the server should be set to response the error code to the TT18-4G like below)

000. Unknown error[server shutdown]
When received this error, the TT18-4G reaction: Disconnect and reconnect to the server

001. Server gateway program exception and cannot receive data temporarily
When received this error, the TT18-4G reaction: Pause for 5 minutes and try to connect to the server.

002. Server overloaded.
When received this error, the TT18-4G reaction: Pause for 5 minutes and try to connect to the server.

003. The server receiving data interval longer than the device data uploading interval.
When received this error, the TT18-4G reaction: Adjust the TT18-4G data sending interval longer, or change the server receiving data interval shorter.

004. Data analysis error
When received this error, the TT18-4G reaction: Ignore this error data and send the next data.

005. The data time out of the server data receiving range
When received this error, the TT18-4G reaction: Ignore the out of time data

006. Unknown devices
When received this error, the device reaction: Stop connecting to the server.

007. The device has been disabled.
When received this error, the device reaction: try to connect to the server after pausing for 5 minutes.

1. Application data protocol

Machine side:

```
{
    "msgtype": / / type, used to confirm different type of data
    "hw": "0407" / / "hardware model",
    "fW": "", / / "firmware version (Format: 0.0.0.0)",
    "imei": "", / / "unique ID (i.e. IMEI, ID)",
    "data": "", / / "data information",
```

"rtc": 2021 / 09 / 09 03:42:04 / / mm / DD / h, min / S
"sn": / / a data serial number. If it is - 1, it means empty
}

Server side:
{
"sta": 0, / / status number, 0 is normal and 1 is error
"data": "/ /" return data area ",
"error": "" / / "if there is an error, you can return the error details"
"errorcode": "" / / error code
}

2. Get server time

{
"msgtype": 1,
"hw": "0407" / /"hardware model",
"fw": / / "firmware version (Format: 0.0.0.0)",
"imeiI": / / "unique identification (i.e. IMEI, ID)",
"sn":
}

Response:
{
"sta": 0,
"data": {
"servertime": 2021/09/09 03:42:04
},
"error": "",
"errorcode": "" / / error code

}

Example:
Request: {msgtype ": 1," hw ":" 0407 "," fw ":" 02.00.00.00 ","imei":" 6999999999999999 "," sn ": 1}

Corresponding: {"sta": 0, "data": {"servertime": "2021 / 09 / 10 10:06:53"}, "error": "", "errorcode": "}

3. Standard data protocol

Request:

```
{
"msgtype": 3,
"hw": "0407" / / "hardware model",
"fw": "", / / "firmware version (Format: 0.0.0.0)",
"imei": "", / / "unique ID (i.e. IMEI,  ID)",
"data": {
  “gps”:["latitude":22.537818,//latitude
          "longitude ":114.537818,//longitude
          "angle":120,//angle
          "speed":12.3,//Speed, unit: Knots
          “utc”:2023/02/21 17:11:56//utc time
        ],
  “lbs”:[
          {"MCC": "460", / / mobile country code
          "MNC": "01", / / mobile network code
          "Lac": "2793", / / region code
          “rxlev”:-68,//Unit: -dBm, only supported by 2G base stations
          "type": "2G" //base station type，2G、NB、CATM、LTE
          },
          {"MCC": "460", / / mobile country code
          "MNC": "01",/ / mobile network code
          "Lac": "2793", / / region code
          "Cell": "0fa1"
          “pci”:272,// Physical Cell ID,decimal, NB、CATM、LTE support
          “earfcn”:3686,// decimal, NB、CATM、LTE support
          “rsrp”:-75,// Current reference signal received power in,unit:-dBm, NB、CATM、LTE
    support
          “rsrq”:-8,// The signal reception quality,unit：-dB, NB、CATM、LTE support
          “rssi”:-8,// Received signal strength indicator value,unit：-dBm, NB、CATM、LTE
    support
          "type": "LTE " //base station type，2G、NB、CATM、LTE
          },
          {"MCC": "460", / / mobile country code
          "MNC": "01", / / mobile network code
          "Lac": "2793", / / region code
          "Cell": "12ae", / /  base station code
          “rxlev”:-68,//unit：-dBm,Only supported by 2G base stations
          "type": "2G " //base station type，2G、NB、CATM、LTE
          }
        ],
```

"Alert": "AA", / / alarm type, AA - normal data, 10 - low voltage alarm, A0 - temperature and humidity alarm, A1 - abnormal temperature and humidity, / / A2 - light sensor status change alarm

"Termsta": "00", / / terminal information, bit6 flight mode , bit5 LSE abnormal, bit4 button pressed ,

//Bit3 - temperature and humidity abnormal, bit2 - temperature and humidity over limit , Bit1 - low voltage ,

//Bit0 USB connection

"gsm": {

"CSQ": 40, / / signal strength

"Sta": "37" / / bit5 If MQTT connection established, bit4 if data sending/receiving network is OK, bit3 if it is roaming

// bit2 if network is connected, Bit1 if the SIM card is detected, bit0 - if the device is turned on},

"Bat": 3.6, / / battery voltage

"Temp": 33.6, / / temperature, unit: 0.1C

"Humi": 58.9, / / humidity, unit: 0.1%

"Light": 0 / / light sensor status, 0-bright, 1-dark

},

"rtc": "2021/09/09 03:42:04",

"sn": 1

}

Response:

{

"sta": 0,

“data”:{

"Ack": 1 / / the SN received must be consistent with the SN published by the machine

},

"error": "",

"Errorcode": "" / / error code

}

request：

{"msgtype":3,"hw":"0407","fw":"03.03.00.00","imei":"699999999999911","data":{"lbs":[{"mcc":"460","mnc":"00","lac":"1D2F","cell":"A7E743F","pci":272,"earfcn":3686,"rsrp":-73,"rsrq":-11,"rssi":-62,"type":"NB"}],"alert":"AA","termsta":"10","gsm":{"csq":26,"sta":"37"},"bat":4.00,"temp":21.7,"humi":49.8,"light":0},"rtc":"2023/02/21 10:02:45","sn":3}

response：

{"sta":0,”data”{“ack”,3}, "error":"",”errorcode”:””}

request：

{"msgtype":3,"hw":"0407","fw":"03.03.00.00","imei":"699999999999911","data":{"lbs":[{"mcc":"460","mnc":"00","lac":"2793","cell":"12CD","rxlev":-71,"type":"2G"},{"mcc":"460","mnc":"00","lac":"2793","cell":"12AF","rxlev":-71,"type":"2G"},{"mcc":"460","mnc":"00","lac":"2793","cell":"1

2CC","rxlev":-73,"type":"2G"}],"alert":"AA","termsta":"10","gsm":{"csq":12,"sta":"37"},"bat":4.00,
"temp":22.2,"humi":49.9,"light":1},"rtc":"2023/02/21 10:08:18","sn":10}
response：
{"sta":0,”data”{“ack”,10}, "error":"",”errorcode”:””}

request：
{"msgtype":3,"hw":"0407","fw":"03.03.00.00","imei":"699999999999911","data":{"gps":["latitud
e":22.538564,"longitude":114.069624,"angle":0,"speed":0.0,"utc":2023/02/21
10:15:55],"lbs":[{"mcc":"460","mnc":"00","lac":"2793","cell":"12CD","rxlev":-69,"type":"2G"},{"
mcc":"460","mnc":"00","lac":"2793","cell":"12AF","rxlev":-67,"type":"2G"},{"mcc":"460","mnc":"
00","lac":"2793","cell":"0EF8","rxlev":-70,"type":"2G"}],"alert":"AA","termsta":"10","gsm":{"csq":
31,"sta":"37"},"bat":2.67,"temp":9.6,"humi":25.6,"light":0},"rtc":"2023/02/21 10:16:01","sn":2}
response：
{"sta":0,”data”{“ack”,2}, "error":"",”errorcode”:””}

request：
{"msgtype":3,"hw":"0407","fw":"03.03.00.00","imei":"699999999999911","data":{"gps":["latitud
e":22.538564,"longitude":114.069624,"angle":0,"speed":0.0,"utc":2023/02/21
10:18:21],"lbs":[{"mcc":"460","mnc":"00","lac":"1D2F","cell":"A7E743F","pci":272,"earfcn":3686,
"rsrp":-72,"rsrq":-11,"rssi":-61,"type":"NB"}],"alert":"AA","termsta":"00","gsm":{"csq":27,"sta":"
37"},"bat":2.66,"temp":11.6,"humi":25.7,"light":0},"rtc":"2023/02/21 10:18:22","sn":4}
response：
{"sta":0,”data”{“ack”,4}, "error":"",”errorcode”:””}

4. Server downward commands setting

Format of server downward commands：

Start bits（1byte）+ Type of data（X1）+ Delimiter（1byte）+ Command（X2）+ Delimiter（1byte）+ Stop bits（1byte）+ End mark（2byte）

1. Start bits：@；
2. Type of data：CMD；
3. Delimiter：，；
4. Command：refer the commands list below；
5. Delimiter：，；
6. Stop bits：#；
7. End：\r\n(0x0D,0x0A)；

For example：@CMD,*000000,018,10#,#
Set the data upload/ storage interval

Down command instruction: the server should send the down command along with the subscribe

Server down command format:

```
{
   "Sta": 0, / / status , 0 is normal and 1 is error
   "data": {
      "downcmd": "" / / down command, such as * 000000,008,0000001#
},
"error": "" / / "if there is an error, there will return the details of error"
"errorcode": "" / / error code
}
```

Format of reply after the machine receives the downlink command

```
{
"msgtype": 4, / / type, used to confirm the different data type
"hw": "0407" / / "hardware model",
"fw": "", / / "firmware version (Format: 0.0.0.0)",
"imei": "", / / "unique ID (i.e. IMEI, Sn, ID)",
"data": {
"resdowncmd": {
"cmd": "", / / received instructions, such as * 000000,008,0000001#
"cmdtype": "", / / down command type, set means write command, read means read command
"sta": "", / / send down command result
"Par": "" / / read down command result
}
},
"rtc": "2021/09/09 03:42:04",
"sn": 1
}
```

Example:

Down command:

{"sta":0,"data":{"downcmd":"*000000,008,1110000#"},"error":"",”errorcode”:””}

reply:

{"msgtype":4,"hw":"0407","fw":"02.00.00.00","imei":"699999999999999","data":{"resdowncmd":{"cmd":"*000000,008,1110000#","cmdtype":"set","sta":"OK"}},"rtc":"2021/09/14 03:26:10","sn":5}

Down command:

{"sta":0,"data":{"downcmd":"*000001,008,1110000#"},"error":"",”errorcode”:””}

reply:

{"msgtype":4,"hw":"0407","fw":"02.00.00.00","imei":"699999999999999","data":{"resdowncmd":{"cmd":"*000001,008,1110000#","cmdtype":"set","sta":"Err"}},"rtc":"2021/09/14 03:31:10","sn":7}

Down command:

{"sta":0,"data":{"downcmd":"*000000,040,008#"},"error":"",”errorcode”:””}

reply:

{"msgtype":4,"hw":"0407","fw":"02.00.00.00","imei":"699999999999999","data":{"resdowncmd":{"cmd":"*000000,040,008#","cmdtype":"read","sta":"OK","par":"1110000"}},"rtc":"2021/09/14 03:40:29","sn":11}

Down command:

{"sta":0,"data":{"downcmd":"*000000,040,088#"},"error":"",”errorcode”:””}

reply:

{"msgtype":4,"hw":"0407","fw":"02.00.00.00","imei":"699999999999999","data":{"resdowncmd":{"cmd":"*000000,040,088#","cmdtype":"read","sta":"unvalid"}},"rtc":"2021/09/14 03:52:58","sn":3}