**ORing streetlight controller**

**MQTT API document**

Version: 1.3a

Date: 2021/05/14



Release Version :

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| --- | --- | --- | --- |
| Version | Release note | author | date |
| 1.2c | Add alarm message (report type 15) for voltage detector in controller data Report format | Richard | 2021/4/21 |
| 1.2d | Add new status “ok” in alarm message | Richard | 2021/4/26 |
| 1.2e | Add time sync report and time set remote command | Richard | 2021/5/5 |
| 1.3a | 1. Add MQTT topic ($thing/[thingID]/$data/report) description for time sync 2. Rewrite chapter 3.1 Controller data Report format description field 3. Add chapter: 3.3 Device Time sync from platform | Tzuhua | 2021/5/14 |

***Streetlight controller***

***MQTT format***

1. **MQTT connection information**

|  |  |
| --- | --- |
| MQTT para | Description |
| Client ID | thing：[ThingID]：[Random number (4 bytes)] |
| Clean session | 1 |
| Keep alive | 3600 |
| Username | [ThingID] |
| Password | [SecretKey] |

1. **MQTT Topic**

|  |  |
| --- | --- |
| Topic | Description |
| $thing/[thingID]/$data/report | 1. For controller data report 2. For controller time sync request |
| $thing/[thingID]/$data/conf/# | For subscribe all configuration topics |
| $thing/[thingID]/$data/conf/info | Parameters report. (The first report after power-on) |
| $thing/[thingID]/$cmd/conf/info | Parameters setting.  For brightness control, remote connection |
| $thing/[thingID]/$data/conf/schedule | For schedule dimming report |
| $thing/[thingID]/$cmd/conf/schedule | For schedule dimming setting  Retain packet would be used on server side |

There is $ in Topic for reserved positions

$cmd in Topic indicates that this topic is used for server-to-controller transmission

$data in Topic indicates that this topic is used by the controller to report back to the server

1. **MQTT packet format**
   1. **Controller data Report format**

Topic: $thing/[thingID]/$data/report

Use JSON format. Put some distributed information at the beginning, such as imei, imsi, Fwver... etc. Place some common data in the array, such as the power data of the street lamp: brightness, voltage, current, PF, etc. Information RSSI collects the RSRQ, RSRP and cell ID of the base station. Collect sensor data on street lights. Through the array, you can inversely calculate the parameter to which the position value belongs.

An example of Payload is as follows:

{"conn":"nb","time":1562657365,"slv":[211,219.89,43.98,0.67,6.51,239.89,209.89],"bs":[-77,-20,-98.1,51565945],"osr":[19.65,332,-0.031,0.004,-0.965]}

Please refer to the following table for the Payload format:

|  |  |
| --- | --- |
| {  "conn": "nb",    "time": 1562657365,  "type": 1,  "alarm":"ok",  "slv": [  98,  219.89,  43.93,  0.67,  6.52,  234.55  210.58  ],  "bs": [  "51565945",  -77,  -98.1  -20,  ],  "osr": [  19.65,  332,  -0.031,  0.004,  -0.965  ]  } | * Device communication type * Use UNIX time stamp to record time until January 19, 2038   If the value is negative, it is addendum data, and the positive value is real-time data.   * Report type * The abnormal form is only available when the return form (type) is 15. The rest of the return patterns do not have this field. Abnormal type: "low voltage" / "high voltage" / "power lost"/ "ok" * Streetlight value  1. Brightness: range 0 ~ 100 % 2. Voltage value, unit V, <float usually 100 ~ 240 V>, 0V when the light is off 3. Current value, unit mA, <float usually 0 ~ 1000 mA> 4. Power Factor value, <float 0 ~ 1> 5. Power value, voltage \* current \* PF value after calculation 6. The maximum voltage value from the last report to the present, in V 7. The minimum voltage value from the last report to the present, in V  * Base station information, only nbiot devices will use  1. Serving Cell ID 2. RSSI，usually negative 3. RSRP，usually negative 4. RSRQ, usually negative  * Sensor info  1. Temperature sensor, unit Celsius, range -35 ~ 150 degrees 2. Lumen value, unit L, range 0 ~ 65535 3. <float axis sensor X usually -1 ~ 1> 4. <float axis sensor Y usually -1 ~ 1> 5. <float axis sensor Z usually -1 ~ 1> |

|  |  |  |
| --- | --- | --- |
| Report type | Type value | Description |
| REPORT\_NORMAL | 0 | upload regularly |
| REPORT\_FIRST | 1 | The first transaction after power-on |
| REPORT\_REBOOT | 2 | RESET command report |
| REPORT\_RECONNECT | 3 | Resend after reconnecting |
| REPORT\_AFTER\_DIMMING | 4 | dimming is completed, extra report |
| *~~REPORT\_HERAT\_CHECK~~* | *~~5~~* | *~~Response to the Healthcheck command~~* |
| REPORT\_AFTER\_REPORT\_TIME | 6 | After adjusting the REPORT\_TIME, extra report |
| REPORT\_AFTER\_INTERVAL | 7 | After adjusting the INTERVAL, extra report |
| *~~REPORT\_LOCK\_CELLID,~~* | *~~8~~* | *~~After adjusting the Lock CELLID, extra report~~* |
| REPORT\_LOCK\_BAND | 9 | After adjusting the Lock Band, extra report |
| REPORT\_AFTER\_OTA\_OK | 10 | Return after successful OTA |
| REPORT\_AFTER\_OTA\_SAME | 11 | OTA check that the version is the same and report back |
| REPORT\_AFTER\_OTA\_NO\_JOB | 12 | OTA will report after NO JOB |
| REPORT\_AFTER\_OTA\_TIMEOUT | 13 | OTA reports overtime for any action |
| REPORT\_AFTER\_OTA\_FAIL | 14 | OTA Firmware check MD5 does not report at the same time |
| REPORT\_ALARM | 15 | Warning abnormal voltage |
| REPORT\_TIME\_SYNC | 16 | Time sync request from device |

* 1. **Controller configuration format**

Information report. Topic: $thing/[thingID]/$data/conf/info

The first packet after booting will report mcuVer, nbVer, imei, imsi to this topic

Payload:

|  |  |
| --- | --- |
| { |  |
| "conn": "nb", | Device communication type "nb" |
| "mcuVer": "v1.0", | Firmware version of Controller |
| "connVer":"Ublox v5.06", | Firmware version of NB module |
| "imei": "352753097338295", | IMEI of NB module |
| "imsi": "466120000006214", | IMSI of the SIM card |
| "rssi": -75, | RSSI value floating point number, only the first packet will be sent (for production test) |
| "dev": [ | This item will be sent only after receiving commands |
| "S1du2d5kM", | Thing ID |
| "1trJ7ARvDEAYvmer", | Secret Key |
| "nbiot", | APN |
| "mqtt.iiot.oringnet.cloud", | MQTT broker name or IP |
| 90, | Report Interval (seconds) |
| 10, | Power delay time (seconds) |
| 501, | Packet delay time (seconds) |
| "fota server", | FOTA server address or URL |
| "fota token", | FOTA token = username = password |
| "fota client ID", | Fota client ID (Serial number) |
| 32, | Time Zone (-48 ~ 48) |
| "3,8,28", | NBiot Band (three bands 3, 8, 28 are currently supported)  Indicates that three bands 3, 8, 28 are currently supported表示目前支援三個band3,8,28 |
| 3600, | MQTT ping time |
| "4", | Reset NB module limitation. Vaule base on 30 minutes. |
| "0510:0730" | Device report stop schedule. |
| ] |  |
| } |  |

**3.2.1** Controllerconfiguration setting. Topic: $thing/[thingID]/$cmd/conf/info

If there is a set value in Payload {"type": "<command>", "value":"<value>"}

If there is no set value in Payload {"type": "<command>"}

Please refer to the table below for <command> and <value>:

|  |  |  |
| --- | --- | --- |
| Command | value | Description |
| dimming | <level> | Light control with record, value is 0 ~ 100  0 for light close. |
| dimmingMP | <level> | Light control without record, value is 0 ~ 100  0 for light close. |
| reboot |  | Trigger device reboot |
| reconnect |  | Trigger device reconnect |
| ota trigger |  | Trigger FOTA |
| nb ota trigger |  | NB module OTA trigger |
| nb urat | <SelectedAcT>[,  <PreferredAct>[,  <2ndPreferredAct>]] | For Ublox CAT-M or NBIoT select  Value example: "7,8" for CAT-M1 is selected, NB is preferred. "8,7" for NB is selected, M1 is preferred. |
| nb ota period | <timer> | For Ublox configures the uFOTA registration and timer for periodic connections to the uFOTA server  <Timer> for periodic connection to the uFOTA server (in seconds); the factoryprogrammed  and default value is 604800 (7 days):  • -1: never periodically connected to the uFOTA server  • 1-4294967295: range in seconds for periodic connections |
| dev set id | <ID> | Set device id |
| dev set ps | <Password> | Set device password |
| dev set apn | <apn> | Set device apn |
| dev set mqtt\_server | <mqtt server> | Set connection MQTT server |
| dev set rpt\_time | <interval> | Report interval every seconds  Default is 60 seconds. |
| dev set ping\_time | <interval> | MQTT Ping interval every seconds.  Default is disable ping.  If ping\_time has value, the device would send MQTT ping. When device publish report to server, the ping time will be reset. Which means the ping\_time should be less than rpt\_time to work. |
| dev set rst\_lmt | <interval> | Device reset NB module limitation.  The <interval> is based on 30 minutes.  For example, set <interval> to 2 would limit the device to pull reset pin once in one hour. |
| dev set rpt\_sche | <start time:end time> | Device report stop schedule. The value should be specific type as : <0530:0710>. It would let the device stop sending report during 5:30 ~ 7:10 everyday. |
| dev set pwr\_delay | <delay time> | Set controller power up delay time for miss attach to base station |
| dev set pkt\_delay | <delay time> | Set controller packet delay time for miss data report. |
| dev set ota\_server | <ota server> | Set OTA server address or URL |
| dev set ota\_token | <token> | Set OTA token |
| dev get all |  | Get device all parameters |
| dev get report |  | Get normal report |
| dev get info |  | Get device info. Report on topic:  $thing/[thingID]/$data/conf/info |
| dev get schedule |  | Get device schedule. Report on topic:  $thing/[thingID]/$data/conf/schedule |
| dev lock\_band | <Band> | <Band> is 1 ~ 64 for lock a specific band for device |
| dev unlock\_band |  | Release all band to device.  In Taiwan the band will be band 3/8/28 |
| time | <timestamp> | Use for time sync request:  If the device reports a time sync request, issue this command to set device time.  (refer 3.3 Device Time sync)  Use UNIX time stamp, UTC standard time, no time zone |

**3.2.2** Schedule setting. Topic: $thing/[thingID]/$cmd/conf/schedule

Payload: {"value":["<Schedule 1>","<Schedule 2>","<Schedule 3>","<Schedule 4>","<Schedule 5 ~ 10>"]}

<Schedule N> is defined as <Time (hhmm):Dimming(Hex 0 ~ 64)>

Example:

{"value":["1400:10","1619:30","1624:00","2308:64","2340:03","1500:10","1719:30","1724:00","2208:61","2240:05"]}

Delete schedule:

{"value":["9999:99","9999:99","9999:99","9999:99","9999:99","9999:99","9999:99","9999:99","9999:99","9999:99"]}

3.2.3 schedule report. Topic: $thing/[thingID]/$data/conf/schedule

Payload: {"value":["1400:10","1619:20","1623:00","1800:64","2200:03"]}

Empty schedule report example:

{"value":[]}

* 1. **Device Time sync from platform**

If the streetlight device want to sync the time from platform, the request will be reported to MQTT topic: $thing/[thingID]/$data/report first. As long as the platform receives the request, it will send a configuration setting command with time information to the device.

1. Device time sync request payload format:

{"type": REPORT\_TIME\_SYNC}

1. Time setting command from platform:

For details, please refer to 3.2.1 Controller configuration setting --> time