



Milesight Gateway

SG50/UG63

MQTT API Specification

| Date | Applicable Firmware Version | Description |
|----------------|-----------------------------|-----------------|
| April 12, 2025 | 64.0.0.3/50.0.0.4 | Initial version |

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1. Introduction

Milesight gateway SG50/UG63 supports MQTT integration with third-party servers to receive data, send downlinks, and configure the embedded network servers. It is necessary to enable an MQTT integration under an application and subscribe data topics as required.

The screenshot shows the 'Application' configuration page for MQTT. It includes a sidebar with navigation options: Status, Packet Forward, Network Server, Network, Service, System, and Maintenance. The main content area has tabs for General, Devices, Application, and Packets. Under the 'Application' tab, there are checkboxes for 'TLS' and 'Last Will and Testament'. Below these is a 'Data Topic' table with columns for Data Type, Topic, Retain, and QoS.

| Data Type | Topic | Retain | QoS |
|-------------------|----------------------|--------------------------|-------|
| Uplink data | <input type="text"/> | <input type="checkbox"/> | QoS 0 |
| Downlink data | <input type="text"/> | <input type="checkbox"/> | QoS 0 |
| Join notification | <input type="text"/> | <input type="checkbox"/> | QoS 0 |
| ACK notification | <input type="text"/> | <input type="checkbox"/> | QoS 0 |
| Request data | <input type="text"/> | <input type="checkbox"/> | QoS 0 |
| Response data | <input type="text"/> | <input type="checkbox"/> | QoS 0 |

All messages between the gateway embedded network server and MQTT brokers are transmitted via JSON formats.

2. Uplink Data

When subscribing to this topic, users can receive the uplink-type data from all end devices within this application.

Report Example

```
{
  "applicationID": "3",
  "applicationName": "test",
  "data": "/wv//wEB/xZnB+CUI3clAf8JAhD/CgEG/w8A",
  "devEUI": "24e124707e094237",
  "deviceName": "AM300",
  "fCnt": 1,
  "fPort": 85,
  "rxInfo": [
    {
      "altitude": "-",
      "latitude": "-",
      "longitude": "-",
      "loRaSNR": 6.1999998092651367,
      "mac": "24e124fffffa0fa8",
      "name": "Local_Gateway",
      "rssi": -49,
      "time": "2025-04-12T02:56:19"
    }
  ],
}
```

```

"time": "2025-04-12T02:56:19",
"txInfo": {
  "frequency": 904700000,
  "adr": true,
  "codeRate": "4/5",
  "dataRate": {
    "modulation": "LORA",
    "bandwidth": 125,
    "spreadFactor": 8
  }
}
}
}

```

Parameters

| Name | Description | |
|---------------|---|---|
| applicationID | Application ID | |
| appName | Application name | |
| data | Payload content of this packet (Base64 format). | |
| devEUI | Device EUI | |
| devicename | Device name | |
| fCnt | Frame counter | |
| fPort | Device application port | |
| rx Info | Device rx info | |
| altitude | altitude | The altitude of the gateway (SG50 Only) |
| | latitude | The latitude of the gateway (SG50 Only) |
| | longitude | The longitude of the gateway (SG50 Only) |
| | loRaSNR | Signal to noise ratio |
| | mac | The gateway MAC address |
| | name | The gateway name |
| | rsi | Signal strength (Unit: dBm) |
| | time | The time for gateway to receive this packet |
| time | The time for gateway to receive this packet | |
| txInfo | Devie tx info | |
| frequency | frequency | The frequency to receive this packet |
| | adr | Device ADR status |
| | codeRate | Code rate |
| | datarate | Data rate |
| | modulation | LORA modulation |

| | | |
|--|-----------------|-----------------------------------|
| | bandwidth | Bandwidth for transmission |
| | spreadingFactor | Spreading factor for transmission |

3. Downlink Data

When subscribing to this topic, users can send downlink commands to end devices. When you require to send the downlink commands to a specific device, please add wildcard "\$deveui" when configuring the downlink topic.

Configure Example:

Downlink data

milesight/downlink/\$deveui

Subscribe Example: milesight/downlink/24E124136A456465

(replace the "\$deveui" as the real device EUI to send downlinks to)

Downlink Example

```
{
  "confirmed": true,
  "fPort": 85,
  "data": "/xD/"
}
```

Downlink Parameters

| Name | Type & Range | Default | Required | Description |
|-----------|--------------|---------|----------|----------------------------------|
| confirmed | bool | - | Yes | Whether requiring the confirmed |
| fPort | int | - | Yes | Application port of the device |
| data | string | - | Yes | Downlink command (Base64 format) |

4. Join Notification

When subscribing to this topic, users can receive the **Join** notifications if the gateway sends the join accept packet to allow the device within this application to join the network.

Report Example

```
{
  "applicationID": "3",
  "applicationName": "test",
  "deviceName": "AM300",
  "devEUI": "24e124707e094237",
  "devAddr": "06b18ccf",
  "time": "2025-04-12T02:56:18"
}
```

Parameters

| Name | Description |
|-----------------|--|
| applicationID | Application ID |
| applicationName | Application name |
| deviceName | Device name |
| devEUI | Device EUI |
| devAddr | Assigned Device Address |
| time | The time to send join accept to the end device |

5. ACK Notification

When subscribing to this topic, users can receive the confirmed packet of the devices when sending confirmed downlink commands to devices.

Report Example

```
{
  "applicationID": "3",
  "applicationName": "test",
  "deviceName": "AM300",
  "devEUI": "24e124707e094237",
  "acknowledged": true,
  "fCnt": 2,
  "time": "2025-04-12T02:56:18"
}
```

Parameters

| Name | Description |
|-----------------|--|
| applicationID | Application ID |
| applicationName | Application name |
| deviceName | Device name |
| devEUI | Device EUI |
| acknowledged | Whether the device receives the downlink |
| fCnt | Frame counter |
| time | The time to send join accept to the end device |

6. Request and Response Data

Milesight gateway provides MQTT API to invoke them to configure the gateway embedded network server settings. Users can subscribe to the Response Data topic to send downlink commands to configure the gateway and subscribe to Response Data topic to get the replies from the downlink commands.

| Data Type | topic |
|-------------------------|----------------------------|
| Uplink data | <input type="text"/> QoS 0 |
| Downlink data | <input type="text"/> QoS 0 |
| Multicast downlink data | <input type="text"/> QoS 0 |
| Join notification | <input type="text"/> QoS 0 |
| ACK notification | <input type="text"/> QoS 0 |
| Error notification | <input type="text"/> QoS 0 |
| Request data | <input type="text"/> QoS 0 |
| Response data | <input type="text"/> QoS 0 |

The request message should be sent via JSON format and the response format is also the JSON format.

Request Format

```
{
  "id": "123",           //Random value
  "method": "GET",      //method
  "url": "/ns/device/add", //url
  "body": {
    //Add contents when method is POST or PUT
  }
}
```

Response Format

```
{
  "id": "123",           //The same as request
  "method": "GET",      //The same as request
  "url": "/ns/device/add", //The same as request
  "body": {
    //Different contents depending on features
  }
}
```

6.1 Add Device

Method: POST

URL: /ns/device/add

Request Example

```
{
  "id": "1",
  "method": "POST",
  "url": "/ns/device/add",
  "body": {
    "name": "EM300",
    "description": "em300",
    "devEUI": "24E124136A456465",
    "classMode": "Class A",
  }
}
```

```

    "netAccess": "OTAA",
    "appKey": "5572404c696e6b4c6f52613230313823",
    "devAddr": "",
    "nwksKey": "5572404c696e6b4c6f52613230313823",
    "appSKey": "5572404c696e6b4c6f52613230313823",
    "fCntUp": 0,
    "fCntDown": 0,
    "fPort": 1,
    "skipFCntCheck": false
  }
}

```

Response Example

```

{
  "id": "1",
  "method": "POST",
  "url": "/ns/device/add",
  "body": {
    //Return 200 if success, failure return code see Appendix
    "code": 200,
    "error": ""
  }
}

```

Request Parameters

| Name | Type & Range | Default | Required | Description |
|---------------|-------------------|----------------------------------|----------|---|
| name | string 64 | devEUI | No | Unique value on the device list |
| description | string 1024 | | No | Device description |
| applicationID | string | - | No | Exist application ID |
| devEUI | string 16(HEX) | - | Yes | Device EUI is unique |
| classMode | string | | Yes | Option: Class A, Class C |
| netAccess | string | | Yes | Option: OTAA, ABP |
| appKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is OTAA |
| devAddr | string 8(HEX) | - | Yes | Necessary to add when join type is ABP |
| nwksKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is ABP |
| appSKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is ABP |
| fCntUp | uint 0~4294967295 | 0 | No | Add when join type is ABP |

| | | | | |
|---------------|-------------------|-------|-----|---------------------------|
| fCntDown | uint 0~4294967295 | 0 | No | Add when join type is ABP |
| fPort | int 1-223 | 1 | Yes | Device application port |
| skipFCntCheck | bool | false | Yes | Frame counter validation |

6.2 Delete Device

Method: DELETE

URL: /ns/device

Request Example

```
{
  "id": "1",
  "method": "DELETE",
  "url": "/ns/device",
  "body": {
    "ids": ["24E124136A456465", "24E124136A456069"]
  }
}
```

Response Example

```
{
  "id": "1",
  "method": "DELETE",
  "url": "/ns/device",
  "body": {
    "code": 200, //Return 200 if success, failure return code see Appendix
    "error": ""
  }
}
```

6.3 Enquire Device

Method: GET

URL: /ns/device?search=&limit=&offset=&applicationId=

Request Example:

1. enquire all devices

```
{
  "id": "1",
  "method": "GET",
  "url": "/ns/device?search=&limit=100&offset=0"
}
```

2. enquire all devices under one application

```
{
  "id": "2",
  "method": "GET",
  "url": "/ns/device?search=&limit=10&offset=0&applicationId=1"
}
```

3. enquire one device

```
{
  "id": "3",
  "method": "GET",
  "url": "/ns/device?search=24E124136A456465&limit=10&offset=0"
}
```

Response Example

```
{
  "id": "1",
  "method": "GET",
  "url": "/ns/device?search=&limit=100&offset=0",
  "body": {
    "total": 2,
    "result": [
      {
        "name": "EM300",
        "description": "em300",
        "devEUI": "24E124136A456465",
        "appEUI": "",
        "classMode": "Class A",
        "netAccess": "OTAA",
        "fPort": 1,
        "skipFCntCheck": false,
        "devAddr": "",
        "appKey": "5572404c696e6b4c6f52613230313823",
        "nwksKey": "",
        "appSKey": "",
        "fCntUp": 0,
        "fCntDown": 0,
        "active": 0,
        "applicationId": "3",
        "applicationName": "test",
        "createTime": "2025-04-12 13:22:06+0800",
        "lastTime": "",
        "channelsConfiguredFlag": 0,
        "rx2ConfiguredFlag": 0,

```

```

    "newChannelsConfiguredFlag": 0
  },
  {
    "name": "AM300",
    "description": "",
    "devEUI": "24e124707E094237",
    "appEUI": "24e124c0002a0001",
    "classMode": "Class A",
    "netAccess": "OTAA",
    "fPort": 85,
    "skipFCntCheck": false,
    "devAddr": "06b18ccf",
    "appKey": "5572404c696e6b4c6f52613230313822",
    "nwksKey": "cb6125fde2cc1894e5984db1016b1cda",
    "appSKey": "eda3215c1a9c34ca6bc8ec76373e9da4",
    "fCntUp": 32,
    "fCntDown": 32,
    "active": 1,
    "applicationId": "3",
    "applicationName": "test",
    "createTime": "2025-04-10 13:29:42+0800",
    "lastTime": "59 seconds ago",
    "channelsConfiguredFlag": 1,
    "rx2ConfiguredFlag": 0,
    "newChannelsConfiguredFlag": 0
  }
],
"deviceMax": 20
}
}

```

Request Parameters

| Name | Type & Range | Default | Required | Description |
|---------------|--------------|---------|----------|--|
| search | string | - | No | The devEUI or device name to search, blank means searching for all devices |
| limit | int | 10 | No | Max amount of enquiring devices |
| offset | int | 0 | No | Enquire from which device |
| applicationId | int | 0 | No | Enquire devices under this application, 0 means enquiring all devices |

Response Parameters

| Name | Type | Description |
|--------|--------|------------------------------|
| total | string | The device amount of enquiry |
| result | Array | The enquiry result |

| | | |
|-----------------|--------|-------------------------------------|
| name | string | Device name |
| description | string | Device description |
| devEUI | string | Device EUI |
| appEUI | string | Device App EUI |
| classMode | string | Device class mode |
| netAccess | string | Device join type |
| fPort | int | Device application port |
| skipFCntCheck | bool | Frame count validation |
| devAddr | string | Device Address |
| appKey | string | |
| nwkSKey | string | |
| appSKey | string | |
| fCntUp | int | Uplink frame counter |
| fCntDown | int | Downlink frame counter |
| active | int | 1: activate, 0: De-activate |
| applicationId | string | Application ID |
| applicationName | string | Application name |
| createTime | string | The time to create the device |
| lastTime | string | The last update time |
| deviceMax | int | The maximum supported device number |

6.4 Modify Device

Before modifying a device, it is suggested to enquire this device first.

Method: PUT

URL: /ns/device/{devEUI}

Request Example

```
{
  "id": "1",
  "method": "PUT",
  "url": "/ns/device/24E124136A456465",
  "body": {
    "name": "EM300",
    "description": "em300",
    "devEUI": "24E124136A456465",
    "classMode": "Class A",
    "netAccess": "OTAA",
    "appKey": "5572404c696e6b4c6f52613230313823",
```

```

    "devAddr": "",
    "nwksKey": "5572404c696e6b4c6f52613230313823",
    "appSKey": "5572404c696e6b4c6f52613230313823",
    "fCntUp": 0,
    "fCntDown": 0,
    "fPort": 1,
    "skipFCntCheck": false,
    "createTime": "2025-04-12 13:22:06+0800",
  }
}

```

Response Example

```

{
  "id": "1",
  "method": "PUT",
  "url": "/ns/device/24E124136A456467",
  "body": {
    //Return 200 if success, failure return code see Appendix
    "code": 200,
    "error": ""
  }
}

```

Request Parameters

| Name | Type & Range | Default | Required | Description |
|---------------|-------------------|----------------------------------|----------|---|
| name | string 64 | - | No | Unique value on the device list |
| description | string 1024 | - | No | Device description |
| applicationID | string | - | No | Exist application ID |
| devEUI | string 16(HEX) | - | Yes | Device EUI is unique |
| classMode | string | | Yes | Option: Class A, Class C |
| netAccess | string | | Yes | Option: OTAA, ABP |
| appKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is OTAA |
| devAddr | string 8(HEX) | - | Yes | Necessary to add when join type is ABP |
| nwksKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is ABP |
| appSKey | string 32(HEX) | 5572404c696e6b4c6f52613230313823 | No | Necessary to add when join type is ABP |
| fCntUp | uint 0~4294967295 | 0 | No | Add when join type is ABP |

| | | | | |
|---------------|-------------------|-------|-----|-------------------------------|
| fCntDown | uint 0~4294967295 | 0 | No | Add when join type is ABP |
| fPort | int 1-223 | 1 | Yes | Device application port |
| skipFCntCheck | bool | false | Yes | Frame counter validation |
| createTime | string | - | Yes | The time to create the device |

Appendix

Return Code List

| Code | Description |
|----------|-------------------|
| 200 | Success |
| 20101001 | Parameter Error |
| 20101002 | devEUI exist |
| 20101003 | Device number max |
| 20101004 | URI is null |

Default RX2/Ping Slot Settings

| Channel Plan | RX2 Frequency/Hz | RX2 Datarate | Ping Slot Frequency/Hz | Ping Slot Datarate |
|--------------|--|---|--|---|
| CN470 | Default: 505300000 Range: 470400000~509700000 | Default:0 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,500KHz) | Default: 508300000 Range: 470400000~509700000 | Default:2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,500KHz) |
| EU868 | Default: 869525000 Range: 863000000~870000000 | Default: 0 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 869525000 Range: 863000000~870000000 | Default: 3 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |
| IN865 | Default: 866550000 Range: 863000000~870000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) | Default: 866550000 Range: 863000000~870000000 | Default: 4 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) |

| | | | | |
|-------|--|--|--|---|
| | | 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) | | 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) |
| RU864 | Default: 869100000 Range: 864000000~870000000 | Default: 0 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 868900000 Range: 864000000~870000000 | Default: 3 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |
| KR920 | Default: 921900000 Range: 920900000~923300000 | Default: 0 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) | Default: 923100000 Range: 920900000~923300000 | Default: 3 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) |
| US915 | Default: 923300000 Range: 923300000~927500000 | Default: 8 Range: 0: DR0(SF10,125kHz) 1: DR1(SF9,125kHz) 2: DR2(SF8,125kHz) 3: DR3(SF7,125kHz) 4: DR4(SF8,500kHz) 8: DR8(SF12,500kHz) 9: DR9(SF11,500kHz) 10: DR10(SF10,500kHz) 11: DR11(SF9,500kHz) 12: DR12(SF8,500kHz) 13: DR13(SF7,500kHz) | Default: 923300000 Range: 923300000~927500000 | Default: 8 Range: 0: DR0(SF10,125kHz) 1: DR1(SF9,125kHz) 2: DR2(SF8,125kHz) 3: DR3(SF7,125kHz) 4: DR4(SF8,500kHz) 8: DR8(SF12,500kHz) 9: DR9(SF11,500kHz) 10: DR10(SF10,500kHz) 11: DR11(SF9,500kHz) 12: DR12(SF8,500kHz) 13: DR13(SF7,500kHz) |
| AU915 | Default: 923300000 Range: 923300000~927500000 | Default: 8 Range: 0: DR0(SF10,125kHz) 1: DR1(SF9,125kHz) 2: DR2(SF8,125kHz) 3: DR3(SF7,125kHz) 4: DR4(SF8,500kHz) 8: DR8(SF12,500kHz) 9: DR9(SF11,500kHz) 10: DR10(SF10,500kHz) | Default: 923300000 Range: 923300000~927500000 | Default: 8 Range: 0: DR0(SF10,125kHz) 1: DR1(SF9,125kHz) 2: DR2(SF8,125kHz) 3: DR3(SF7,125kHz) 4: DR4(SF8,500kHz) 8: DR8(SF12,500kHz) 9: DR9(SF11,500kHz) 10: |

| | | | | |
|---------|--|---|--|---|
| | | 11:DR11(SF9,500kHz) 12: DR12(SF8,500kHz) 13: DR13(SF7,500kHz) | | DR10(SF10,500kHz) 11:DR11(SF9,500kHz) 12: DR12(SF8,500kHz) 13: DR13(SF7,500kHz) |
| AS923-1 | Default: 923200000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 923400000 Range: 915000000~92 8000000 | Default: 3 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |
| AS923-2 | Default: 921400000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 921600000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |
| AS923-3 | Default: 916600000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 916800000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |
| AS923-4 | Default: 917300000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) | Default: 917500000 Range: 915000000~92 8000000 | Default: 2 Range: 0: DR0(SF12,125kHz) 1: DR1(SF11,125kHz) 2: DR2(SF10,125kHz) 3: DR3(SF9,125kHz) 4: DR4(SF8,125kHz) 5: DR5(SF7,125kHz) 6: DR6(SF7,250KHz) |

-End-