Document Number	QW_02_0045.001

MQTT & MQTTS Broker

Installation & Command Lines

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1. MQTT Broker Installation & Setting

1.1 Install MQTT Broker

#Login to Linux (Ubuntu) with "root privileges"

apt-get install python-software-properties

apt-get install software-properties-common

apt-add-repository ppa:mosquitto-dev/mosquitto-ppa

apt-get update

apt-get install mosquitto

apt-get install mosquitto-clients

apt-get install libmosquitto-dev

apt-get update

1.2 MQTT Broker Setting

1. Create an access control list file and set username and password by giving the below command.

Example: Set username "*gemtek*" and password "*gemtek123*"

```
root@ubuntu:/# mosquitto_passwd -c /etc/mosquitto/passwd gemtek
Password: (Entry gemtek123)
Reenter password: (Entry again gemtek123)
```

2. Add the access control list file path "*password_file*" and the "*allow_anonymous*" setting to mosquitto.conf

Example:

vim.tiny /etc/mosquitto/mosquitto.conf

Add "password_file" and "allow_anonymous" setting to mosquitto.conf

password_file /etc/mosquitto/passwd

allow_anonymous false

Example:

```
root@ubuntu:/# vim.tiny /etc/mosquitto/mosquitto.conf

# Place your local configuration in /etc/mosquitto/conf.d/
# A full description of the configuration file is at
# /usr/share/doc/mosquitto/examples/mosquitto.conf.example
pid_file /var/run/mosquitto.pid
persistence true
persistence_location /var/lib/mosquitto/
log_dest file /var/log/mosquitto/mosquitto.log
include_dir /etc/mosquitto/conf.d
password_file /etc/mosquitto/passwd
allow_anonymous false
```

Add "password_file" and "allow_anonymous" settings to mosquitto.conf

3. Restart the mosquitto broker

Example:

```
root@ubuntu:/# /etc/init.d/mosquitto restart
mosquitto stop/waiting
mosquitto start/running, process 7572
```

2. MQTTS Broker Installation & Setting

2.1 Install MQTT Broker

Install MQTT Broker.

Ref. "1.MQTT Broker Install & Setting"

2.2 Create an SSL Certificate

1. Create CA File (ca.key and ca.crt)

Example:

```
root@ubuntu:/# openssl req -new -x509 -days 36500 -extensions v3_ca -keyout ca.key -out ca.crt
        Generating a 2048 bit RSA private key
        .....+++
        .............+++
        writing new private key to 'ca.key'
Enter PEM pass phrase: (Entry password)
Verifying - Enter PEM pass phrase: (Entry password)
        -----
        You are about to be asked to enter information that will be incorporated
```

```
        into your certificate request.
        What you are about to enter is what is called a Distinguished Name or a DN.
        There are quite a few fields but you can leave some blank
        For some fields there will be a default value,
        If you enter '.', the field will be left blank.
        -----
        Country Name (2 letter code) [AU]:TW
        State or Province Name (full name) [Some-State]:TS
        Locality Name (eg, city) []:TS
        Organization Name (eg, company) [Internet Widgits Pty Ltd]:TS
        Organizational Unit Name (eg, section) []:TS
        Common Name (e.g. server FQDN or YOUR name) []:TS
Email Address []:TS@gmail.com
```

2.Create Server CA File(ca.key, ca.csr and ca.crt)

Example:

```
root@ubuntu:/# openssl genrsa -out server.key 2048
Generating RSA private key, 2048 bit long modulus
.....................................................................+++
.....................+++
e is 65537 (0x10001)

root@ubuntu:/# openssl req -out server.csr -key server.key -new
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:tw
State or Province Name (full name) [Some-State]:ts1
Locality Name (eg, city) []:ts1
Organization Name (eg, company) [Internet Widgits Pty Ltd]:ts1
Organizational Unit Name (eg, section) []:ts1
Common Name (e.g. server FQDN or YOUR name) []:ts1
Email Address []:ts1@gmail.com
Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:password
An optional company name []:ts1

root@ubuntu:/# openssl x509 -req -in server.csr -CA ca.crt -CAkey ca.key -CAcreateserial -out server.crt -days 36500
Signature ok
subject=/C=tw/ST=ts1/L=ts1/O=ts1/OU=ts1/CN=ts1/emailAddress=ts1@gmail.com
Getting CA Private Key
Enter pass phrase for ca.key: (Entry password)
```

2.3 MQTTS Broker Setting

Add the access control list file path "password_file" and the "allow_anonymous" settings to mosquitto.conf

Example:

vim.tiny /etc/mosquitto/mosquitto.conf

Add port number, capath, PEM encoded server certificate & PEM encoded server key file to mosquitto.conf

password_file /etc/mosquitto/passwd

allow_anonymous false

Example:

```
root@ubuntu:/# root@ubuntu:/# vim.tiny /etc/mosquitto/mosquitto.conf

# Place your local configuration in /etc/mosquitto/conf.d/
# A full description of the configuration file is at
# /usr/share/doc/mosquitto/examples/mosquitto.conf.example
pid_file /var/run/mosquitto.pid
persistence true
persistence_location /var/lib/mosquitto/
log_dest file /var/log/mosquitto/mosquitto.log
include_dir /etc/mosquitto/conf.d

password_file /etc/mosquitto/passwd
allow_anonymous false


#---MQTTs--------
port 8883
cafile /etc/mosquitto/ca.crt
certfile /etc/mosquitto/server.crt
keyfile /etc/mosquitto/server.key
```

Add port number, ca.crt, server.crt and server.key to mosquitto.conf

3. Femto Network Server Setting

3.1 MQTT Network Server Setting

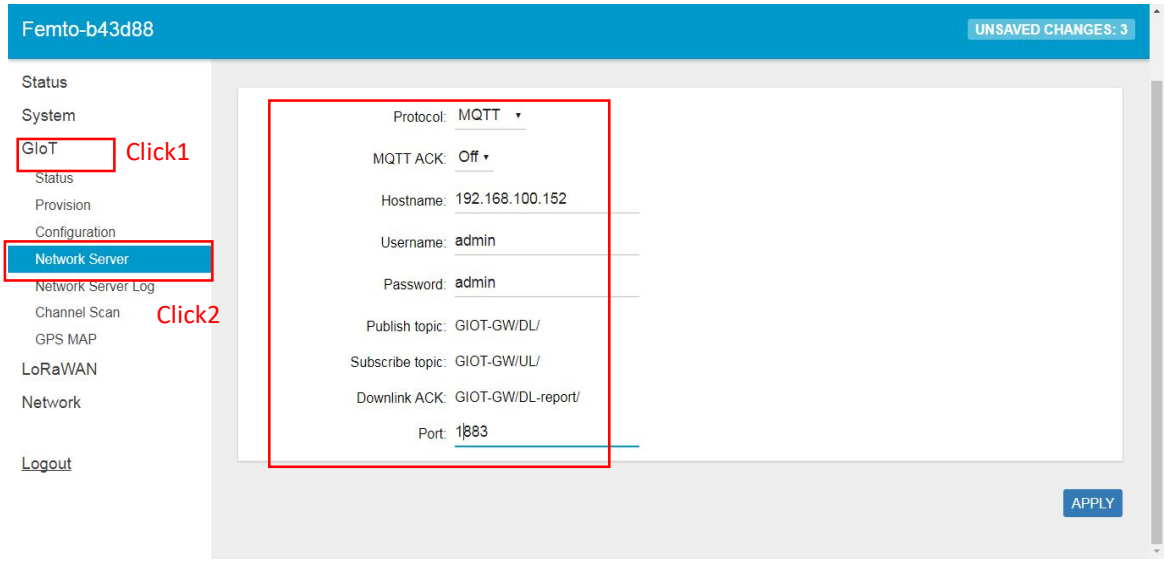


Figure1: Femto Nework Server MQTT Setting Page

Field Definitions for Setting Page:

Protocol: MQTT

MQTT ACK: Off

Hostname: Broker IP Address <EX: 192.168.100.152>

Username: Broker Username<EX: gemtek>

Password: Broker Password <EX: gemtek123>

Port: Broker Port <mqtt default: 1883>

Path: GIoT > Network Server

NOTE: Hostname: Broker IP Address is equivalent to “inet addr” in Linux system.

Example:

```
root@ubuntu:~$ ifconfig
eth0    Link encap:Ethernet  HWaddr 00:50:56:28:73:01
        inet addr:192.168.100.152  Bcast:192.168.100.255  Mask:255.255.255.0
        inet6 addr: fe80::250:56ff:fe28:7301/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:3299619 errors:0 dropped:0 overruns:0 frame:0
        TX packets:199409 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:451529888 (451.5 MB)  TX bytes:15036679 (15.0 MB)
```

3.2 MQTTS Network Server Setting

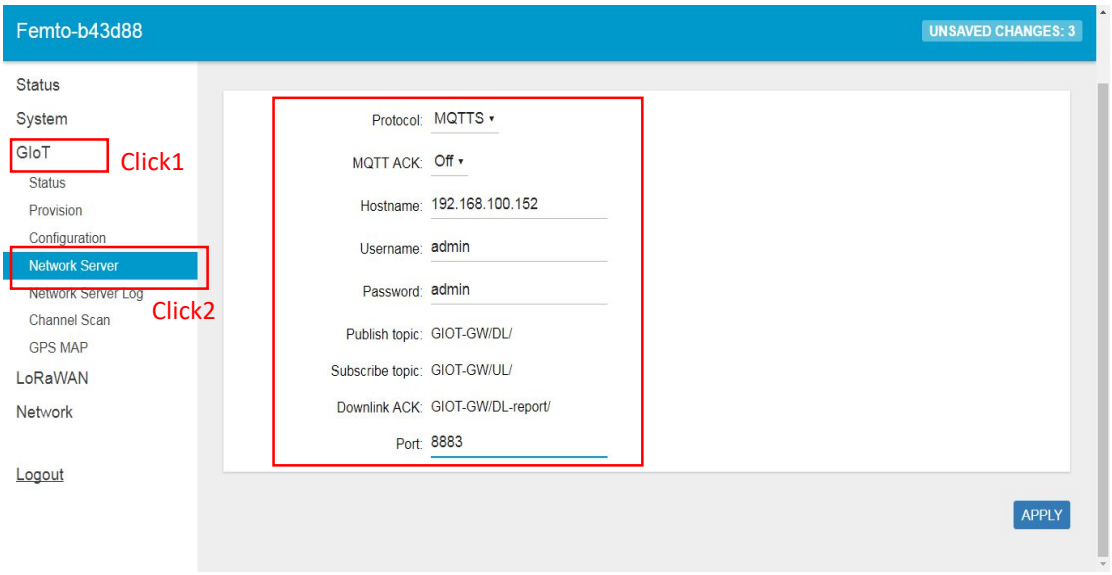


Figure2: Femto Nework Server MQTTS Setting Page

Field Definitions for Setting Page:

Protocol : MQTTS

MQTT ACK: Off

Hostname: Broker IP Address <EX: 192.168.100.152>

Username: Broker Username<EX: gemtek>

Password: Broker Password <EX: gemtek123>

Port: Broker Port (mqtts default: 8883)

Path: GIoT > Network Server

NOTE: Hostname: Broker IP Address is equivalent to “inet addr” in Linux system.

Example:

```
root@ubuntu:~$ ifconfig
eth0    Link encap:Ethernet    HWaddr 00:50:56:28:73:01
        inet addr:192.168.100.152    Bcast:192.168.100.255    Mask:255.255.255.0
        inet6 addr: fe80::250:56ff:fe28:7301/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST    MTU:1500    Metric:1
        RX packets:3299619 errors:0 dropped:0 overruns:0 frame:0
        TX packets:199409 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:451529888 (451.5 MB)    TX bytes:15036679 (15.0 MB)
```

4. Subscribe Up-Link

With ClassA & ClassC explained collectively in general.

4.1. MQTT: Subscribe Up-link format presented as follows.

mosquitto_sub -d -h [broker IP] -t GIOT-GW/UL/[MAC] -u [broker username] -P [broker password]

Format Definition:

[broker IP]: Broker IP Address. <EX: 192.168.100.152>

[MAC] : LoRa AP's MAC<EX: 1C497BB44220>

NOTE: MAC alphanumeric characters ought to be in upper-case, identical to the label.

[broker username]: Broker UserName <EX: gemtek>.

[broker password]: Broker Password. <EX: gemtek123>

Example of different formats:

1. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/1C497BB44220 -u gemtek -P gemtek123
2. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/# -u gemtek -P gemtek123 (For undesignated AP)

```
root@ubuntu:/home/test# mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/1C497BB44220 -u gemtek -P
gemtek123
Client mosqsub/13129-ubuntu sending CONNECT
Client mosqsub/13129-ubuntu received CONNACK
Client mosqsub/13129-ubuntu sending SUBSCRIBE (Mid: 1, Topic: GIOT-GW/UL/#, QoS: 0)
Client mosqsub/13129-ubuntu received SUBACK
Subscribed (mid: 1): 0`
Client mosqsub/13129-ubuntu received PUBLISH (d0, q0, r0, m0, 'GIOT-GW/UL/1C497BB44220', ... (299 bytes))
[{"channel":923400000, "sf":12, "time":"2017-11-20T06:38:51", "gwip":"192.168.100.200",
"gwid":"000011111111abcd", "repeater":"00000000ffffffff", "systype":20, "rssi":-70.0, "snr":20.8, "snr_max":40.0,
"snr_min":8.3, "macAddr":"00000000140001ac", "data":"3134303030314143", "frameCnt":6, "fport":1}]
```

Received Up-Link

4.2 MQTTS: Subscribe Up-link format presented as follows.

mosquitto_sub -d -h [broker IP] -p [broker port] -t GIOT-GW/UL/[MAC] -u [broker username] -P [broker password] --cafile [ca.crt path] --insecure

Format Definition:

[broker IP]: Broker IP Address. <EX: 192.168.100.152>

[broker port]: Broker Port Number <EX 8883>

[MAC] : LoRa AP's MAC<EX: 1C497BB44220>

NOTE: MAC alphanumeric characters ought to be in upper-case, identical to the label.

[broker username]: Broker UserName <EX: gemtek>.

[broker password]: Broker Password. <EX: gemtek123>

[ca.crt path]: ca.crt file <EX: /etc/mosquitto/ca.crt >

Example:

1. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/1C497BB44220 -u gemtek -P gemtek123 --cafile /etc/mosquitto/ca.crt –insecure
2. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/# -u gemtek -P gemtek123 --cafile /etc/mosquitto/ca.crt --insecure (For undesignated AP)

```
root@ubuntu:/home/test# mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/UL/1C497BB44220 -u gemtek -P
gemtek123  --cafile /etc/mosquitto/ca.crt --insecure
Client mosqsub/13129-ubuntu sending CONNECT
Client mosqsub/13129-ubuntu received CONNACK
Client mosqsub/13129-ubuntu sending SUBSCRIBE (Mid: 1, Topic: GIOT-GW/UL/#, QoS: 0)
Client mosqsub/13129-ubuntu received SUBACK
Subscribed (mid: 1): 0`
                                                    Received Up-Link
Client mosqsub/13129-ubuntu received PUBLISH (d0, q0, r0, m0, 'GIOT-GW/UL/1C497BB44220', ... (302 bytes))
[{"channel":923400000, "sf":12, "time":"2017-11-20T06:38:51", "gwip":"192.168.100.200",
"gwid":"000011111111abcd", "repeater":"00000000ffffffff", "systype":20, "rssi":-70.0, "snr":20.8, "snr_max":40.0,
"snr_min":8.3, "macAddr":"00000000140001ac", "data":"3134303030314143", "frameCnt":6, "fport":1}]
```

5. Publish Down-Link

ClassA Down-Link Steps

Step 1: Subscribe for Up-Link, Subscribe for Down-Link & Subscribe for Down-Result.

Step 2: Send an Uplink Data from End Node to AP. Make sure that the Broker receives the Uplink Data. (Up-link Subscription)

Step 3: Send a Downlink data from Broker to AP. Make sure that the downlink delivery is successful. (Down-link Subscription will show Downlink Data & the Status will show “-1” in Down-link Result Subscription)

Step 4: Send the Uplink Data from End Node to AP. AP will send Downlink Data concurrently.

Step 5: Resend the Uplink Data from End Node to AP. The Status will show “0” in Down-link Result Subscription.

ClassC Down-Link Steps

Step 1: Subscribe for Up-Link, Subscribe for Down-Link & Subscribe for Down-Result.

Step 2: Send an Uplink Data from End Node to AP. Make sure that the Broker receives the Uplink Data. (Up-link Subscription)

Step 3: Send a Downlink data from Broker to AP. Make sure that the downlink delivery is successful. (The Status will show “0” in Down-link Result Subscription)

5.1 MQTT: Publish Down-link format presented as follows.

```
mosquitto_pub -d -h [broker IP] -t GIOT-GW/DL/[MAC] -u [broker username] -P [broker password]
-m [ {\"macAddr\":\"[NID]\",\"data\":\" [Data]\",\"id\":\"
[ID]\",\"extra\":{\"port\":[Port],\"txpara\":\"[Txpara]\"}}]"
```

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.100.152:>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[DATA] : <String>, Raw data

[ID] : <String>, The ID that is used for the server to track status, you can give any string here

NOTE: IDs are unidentical and unrepeated.

[Port] : <Number>, Function port.

[Txpara] : <Number>, Down-Link Parameter

NOTE: Down-Link Parameter is provided in binary to hex.

Txpara defined 6-bits

Example: txpara=6 (000110); Class A(00) / Confirmed message(01) / RX2 (10)

Table1. Tx Parameter Format

classType		ConfirmedMsg		SendToWindow	
0	0	0	1	1	0
00 : Class A 10 : Class C		00 : Unconfirmed Message 01 : Confirmed Message **(If downlink fails to deliver, 3 attempts will be carried out. Class C does not support this function.)**		01 : RX1 10 : RX2	

Example

mosquitto_pub -d -h 192.168.100.152 -t GIOT-GW/DL/000011111111abcd -u gemtek -P gemtek123 -m "[{\"macAddr\":\"00000000140001ac\",\"data\":\"D00A0100\",\"id\":\"w\",\"extra\":{\"port\":1,\"txpara\":\"6\"}}]"

```
root@ubuntu:/home/test# mosquitto_pub -d -h 192.168.100.152 -t GIOT-GW/DL/000011111111abcd -u gemtek -P gemtek123 –m
"[{\"macAddr\":\"00000000140001ac\",\"data\":\"D00A0100\",\"id\":\"w\",\"extra\":{\"port\":1,\"txpara\":\"6\"}}]"
Client mosqpub/13414-ubuntu sending CONNECT
Client mosqpub/13414-ubuntu received CONNACK
Client mosqpub/13414-ubuntu sending PUBLISH (d0, q0, r0, m1, 'GIOT-GW/DL/000011111111abcd ', ... (91 bytes))
Client mosqpub/13414-ubuntu sending DISCONNECT
```

5.2 MQTTS: Publish Down-link format presented as follows.

mosquitto_pub -d -h [broker IP] -p [broker port] -t GIOT-GW/DL/[MAC] -u [broker username] -P [broker password] --cafile [ca.crt path] --insecure -m [{\"macAddr\":\"[NID]\",\"data\":\"[Data]\",\"id\":\" [ID]\",\"extra\":{\"port\":[Port],\"txpara\":\"[Txpara]\"}}]"

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.100.152:>

[broker port]: Broker Port Number<EX 8883>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

[ca.crt path]: ca.crt file <EX: /etc/mosquitto/ca.crt >

[NID] : <String>, Node MAC address <EX: 00000000140001ac >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[DATA] : <String>, Raw data

NOTE: DATA is provided in hexadecimal format.

[ID] : <String>, The ID that is used for the server to track status, you can give any string here

NOTE: IDs are unidentical and unrepeated.

[Port] : <Number>, Function port.

[Txpara] : <Number>, Down-Link Parameter

NOTE: Down-Link Parameter is provided in binary to hex.

Txpara defined 6-bits

Ex: txpara=6 (000110); Class A(00) / Confirmed message(01) / RX2 (10) *Please Ref. Table1*

Example:

mosquitto_pub -d -h 192.168.100.166 -p 8883 -t GIOT-GW/DL/00001c497b3b8105 -u admin -P admin --cafile /etc/mosquitto/ca.crt --insecure -m "[{\"macAddr\":\"00000000abcd1234\",\"data\":\"ad280600ae\",\"id\":\"11\",\"extra\":{\"port\":1,\"txpara\":\"6\"}}]"

```
root@ubuntu:/home/test# mosquitto_pub -d -h 192.168.100.166 -p 8883 -t GIOT-GW/DL/00001c497b3b8105 -u admin -P admin --cafile /etc/mosquitto/ca.crt --insecure -m "[{\"macAddr\":\"00000000abcd1234\",\"data\":\"ad280600ae\",\"id\":\"11\",\"extra\":{\"port\":1,\"txpara\":\"6\"}}]"
Client mosqpub/7788-ubuntu sending CONNECT
Client mosqpub/7788-ubuntu received CONNACK
Client mosqpub/7788-ubuntu sending PUBLISH (d0, q0, r0, m1, 'GIOT-GW/DL/00001c497b3b8105', ... (94 bytes))
Client mosqpub/7788-ubuntu sending DISCONNECT
```

6. Subscribe Down-Link

6.1 MQTT: Subscribe Down-link format presented as follows.

mosquitto_sub -d -h [broker IP] -t GIOT-GW/DL/[MAC] –u [broker username] –P [broker password]

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.10.152>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

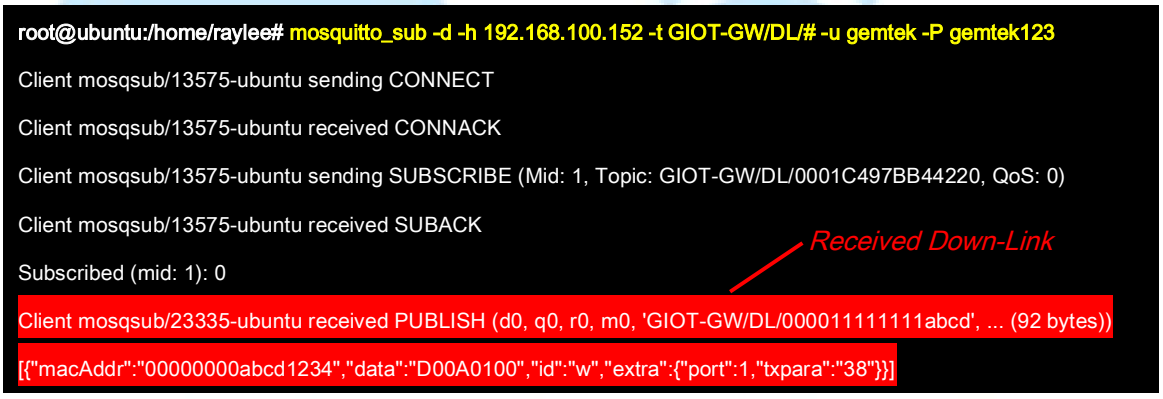
NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

Example:

1. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/DL/# -u admin -P admin (For undesignated AP)
2. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/DL/000011111111abcd -u admin -P admin



6.2 MQTTS: Subscribe Down-link format presented as follows.

mosquitto_sub -d -h [broker IP] -p [broker port] -t GIOT-GW/DL/[MAC] -u [broker username] -P [broker password] --cafile [ca.crt path] --insecure

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.10.152>

[broker port]: Broker Port Number <EX 8883>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

Example:

1. mosquitto_sub -d -h 192.168.100.166 -p 8883 -t GIOT-GW/DL/# -u admin -P admin --cafile /etc/mosquitto/ca.crt --insecure (For undesignated AP)
2. mosquitto_sub -d -h 192.168.100.152 -p 8883 -t GIOT-GW/DL/000011111111abcd -u admin -P admin --cafile /etc/mosquitto/ca.crt --insecure

```
root@ubuntu:/home/raylee# mosquitto_sub -d -h 192.168.100.166 -p 8883 -t GIOT-GW/DL/# -u admin -P admin
--cafile /etc/mosquitto/ca.crt --insecure
Client mosqsub/13575-ubuntu sending CONNECT
Client mosqsub/13575-ubuntu received CONNACK
Client mosqsub/13575-ubuntu sending SUBSCRIBE (Mid: 1, Topic: GIOT-GW/DL/0001C497BB44220, QoS: 0)
Client mosqsub/13575-ubuntu received SUBACK
Subscribed (mid: 1): 0
Client mosqsub/23335-ubuntu received PUBLISH (d0, q0, r0, m0, 'GIOT-GW/DL/000011111111abcd', ... (94 bytes))
[{"macAddr":"00000000abcd1234","data":"D00A0100","id":"w","extra":{"port":1,"txpara":"6"}}]
```

Received Down-Link

7. Subscribe Down-Link Result

7.1 MQTT: Subscribe Down-link result format presented as follows.

mosquitto_sub -d -h [broker IP] -t GIOT-GW/DL-report/[MAC] -u [broker username] -P [broker password]

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.10.152:>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

Example:

1. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/DL-report/# -u gemtek -P gemtek123 (For undesignated AP) or
2. mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/DL-report/0000111111111111abcd -u gemtek -P gemtek123

```
root@ubuntu:/home/test# mosquitto_sub -d -h 192.168.100.152 -t GIOT-GW/DL-report/# -u gemtek -P gemtek123
Client mosqsub/14175-ubuntu sending CONNECT
Client mosqsub/14175-ubuntu received CONNACK
Client mosqsub/14175-ubuntu sending SUBSCRIBE (Mid: 1, Topic: GIOT-GW/DL-report/#, QoS: 0)
Client mosqsub/14175-ubuntu received SUBACK
Subscribed (mid: 1): 0
Client mosqsub/13413-ubuntu received PUBLISH (d0, q0, r0, m0, 'GIOT-GW/DL-report/000011111111abcd', ... (57
bytes)) {"dataId":"w", "resp":"2017-11-20T15:56:04Z", "status":0}
```

Received Down-Link Result

Table2. DL Report Status Define

Status	Define
-2:	The data is queuing in the Routing Service.
-1	The data were sent to the AP/gateway.
0	If the Downlink Txpara parameter shows Confirmed Message, this implies that the data had been sent to the node successfully; If the Txpara parameter shows unConfirmed Message, this implies that the data had been sent to the node but was unsuccessfully acknowledged.
4xx	Client side error. Please check the error description and fix the request
5xx	Server side error. Please contact to the system administrators.
1	The data were dropped because of timeout
2	The data were dropped because of retry more than 3 times.
3	The data were dropped because of AP/gateway queue full.

7.2 MQTTS: Subscribe Down-link result format such as the following,

mosquitto_sub -d -h [broker IP] –p [broker port] -t GIOT-GW/DL-report/[MAC] -u [broker username] -P [broker password] --cafile [ca.crt path] --insecure

Format Definition:

[broker IP]: Broker IP Address. <EX 192.168.10.152:>

[broker port]: Broker Port Number <EX 8883>

[MAC] : LoRa Module MAC <EX: 000011111111abcd >

NOTE: MAC alphanumeric characters ought to be in lower-case and 16-byte hexadecimal.

[broker username]: Broker UserName. <EX: gemtek >

[broker password]: Broker Password. <EX: gemtek123 >

Example:

1. mosquitto_sub -d -h 192.168.100.152 -p 8883 -t GIOT-GW/DL-report/# -u gemtek -P gemtek123 --cafile /etc/mosquitto/ca.crt --insecure (For undesignated AP)
2. mosquitto_sub -d -h 192.168.100.152 -p 8883 -t GIOT-GW/DL-report/0000111111111111abcd -u gemtek -P gemtek123 --cafile /etc/mosquitto/ca.crt --insecure

```
root@ubuntu:/home/test# mosquitto_sub -d -h 192.168.100.152 -p 8882 -t GIOT-GW/DL-report/# -u gemtek -P
gemtek123 --cafile /etc/mosquitto/ca.crt --insecure
Client mosqsub/14175-ubuntu sending CONNECT
Client mosqsub/14175-ubuntu received CONNACK
Client mosqsub/14175-ubuntu sending SUBSCRIBE (Mid: 1, Topic: GIOT-GW/DL-report/#, QoS: 0)
Client mosqsub/14175-ubuntu received SUBACK
Subscribed (mid: 1): 0
Client mosqsub/13413-ubuntu received PUBLISH (d0, q0, r0, m0, 'GIOT-GW/DL-report/000011111111abcd', ... (57 byt
{"dataId":"w", "resp":"2017-11-20T15:56:04Z", "status":0}
```

Received Down-Link Result