INGICS TECHNOLOGY iGS03W Beacon Gateway User Manual

Contents

1 INGICS TECHNOLOGY iGS03W Beacon Gateway
2 Overview
3 SIM
4 Payload Format
5 Button
6 LEDs
7 Configuration
8 Web User Interface
8.1 Network
8.2 Applications
9 Common Settings
10 Advanced
10.1 Security
10.2 LTE
11 Certification
11.1 FCC Statements
12 Revision History
13 Documents / Resources
14 Related Posts

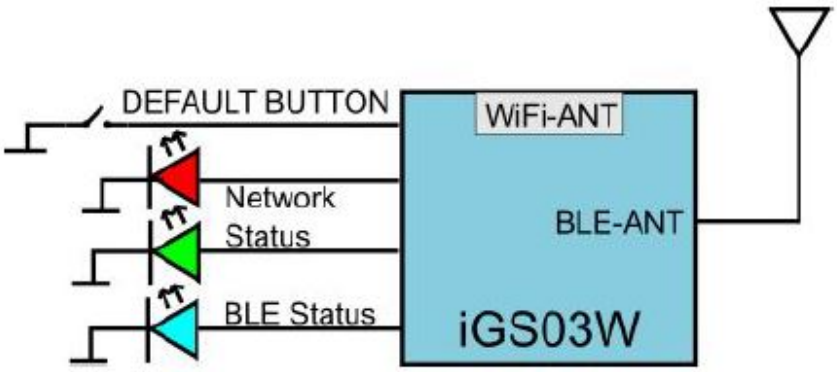
INGICS

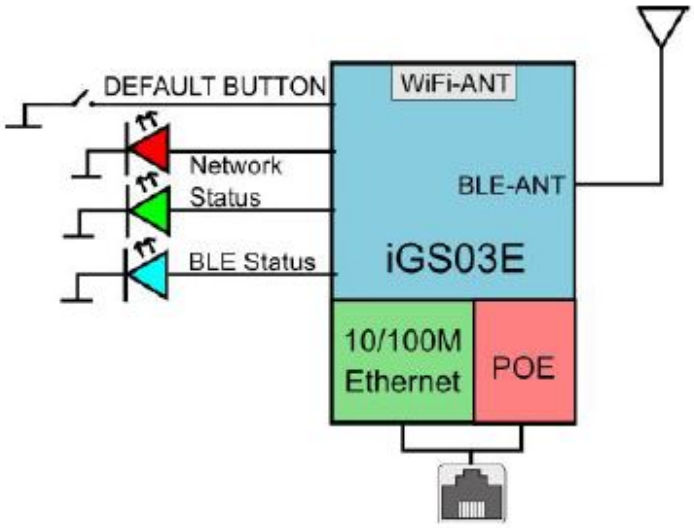
INGICS TECHNOLOGY iGS03W Beacon Gateway

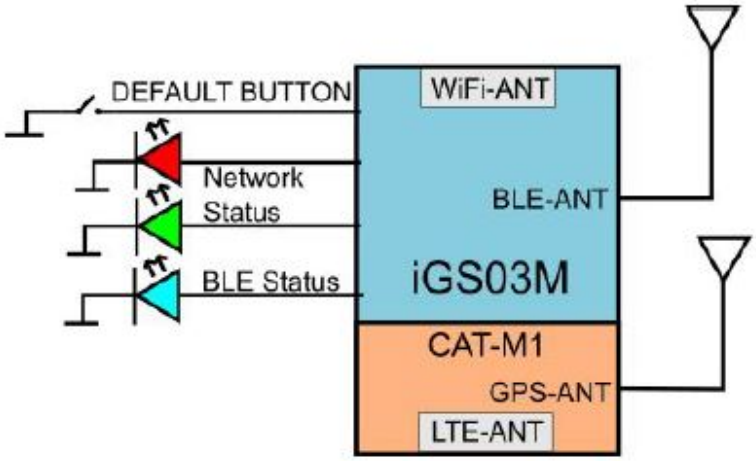
Overview

The iGS03 BLE gateway scans beacons(like iBeacon or Eddystone), proprietary tags, or BLE sensors then sends the payload to TCP, HTTP or MQTT server. Users can configure the transmit period and server endpoint through a simple web UI. There are three models, iGS03W, iGS03E and iGS03M, representing different uploading interfaces, WiFi, Ethernet, and LTE-M.

Block Diagram


DEFAULT BUTTON
WiFi-ANT
Network
Status
BLE-ANT
BLE Status
iGS03W


DEFAULT BUTTON
WiFi-ANT
Network
Status
BLE-ANT
BLE Status
iGS03E
10/100M
Ethernet
POE


DEFAULT BUTTON
WiFi-ANT
Network
Status
BLE-ANT
BLE Status
iGS03M
CAT-M1
GPS-ANT
LTE-ANT

SIM

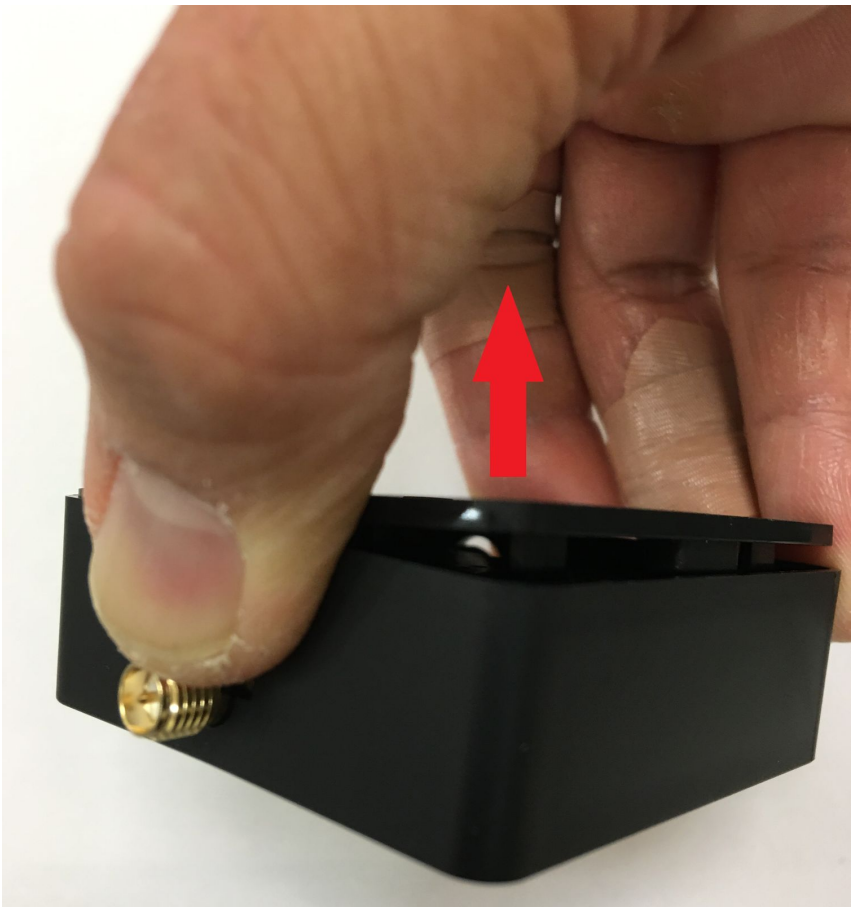
To use iGS03M (LTE-M Model), you have to put a Cat-M1 micro-SIM card into the socket of iGS03M. Please open the bottom cover to insert the SIM card. The steps to open the bottom cover are as below,

1. Step 1. Remove external BLE antenna

2. Step 2. Remove the screw from the bottom cover

3. Step 3. Use a finger to press and hold the arrow part

4. Step 4. Pull out the bottom cover



WiFi (iGS03W/iGS03M)
The 2.4G WiFi AP connection is used to configure the unit through web UI. iGS03 works as an WiFi Access Point(AP) supporting DHCP. Users must connect to this AP to configure the unit.
Ethernet (iGS03E)
It supports 10BASE-T and 100BASE-TX with HP Auto-MDIX. Through the Ethernet, the gateway can bridge your BLE devices to the local TCP server or cloud server for management. iGS03E is a DHCP client by default. To configure it, you have to connect it to a router with DHCP enabled. The first thing is to find iGS03E's IP address in this network so that you can get into it's webUI for configuration. If you don't know the IP address, you may need to use some tool to find it.(For example, the "Fing" APP in Android & iOS. Join your smartphone or tablet with "Fing" in the same network. And use it to scan all the devices in this network)
BLE
The BLE subsystem operates in listening mode. It collects the messages advertised by BLE devices. These messages are then sent to the cloud server configured by the user. iGS03 supports two BLE modes

1. LE 1M PHY: including BLE4.2(Legacy)/BLE5, 1M in 100% duty cycle
2. LE Coded PHY: BLE5, 125K(long-range) in 100% duty cycle

Users can use webUI or telnet command to configure the mode.

GNSS (iGS03M)

The GNSS function is turned "off" by default. Users can use webUI to enable or disable GNSS. For detail settings, use below telnet commands to manage the GNSS behavior:

GNSS ENABLE Enable/Disable GNSS, default off GNSS FIXCOUNT Number of attempts for positioning, 0 indicates continuous positioning. default 0 GNSS FIXRATE The interval time between the first and second time positioning, default 1 (1 second) GNSS RPTRATE The interval time for sending GPSR report, default 600 (10 minutes) GNSS INFO To get latest GPS status

Example case 1: The device is in fixed position:

e.g.

- GNSS ENABLE 1
- GNSS FIXCOUNT 5
- GNSS FIXRATE 60
- GNSS RPTRATE 60

Then GNSS will be enabled and get positioned for 5 times with a 60 seconds interval. GNSS will be off automatically after getting position for 5 times.

Example case 2: The device is moving:

e.g.

- GNSS ENABLE 1
- GNSS FIXCOUNT 0
- GNSS FIXATE 1
- GNSS RPTRATE 60

Then GNSS will be enabled and continuously get a position with 1-second interval, and it will send a GPSR report every 60 sec.

Payload Format

There are several kinds of payload format that iGS03 will send to the server.

BLE

General format:

$<report type>,<tag id>,<gateway id>,<rssi>,<raw packet content>,*<unix epoch timestamp>\r\n

<report type>	Different report type to distinguish the source of the report.
<tag id>	MAC address or ID of tag/beacon
<gateway id>	MAC address of gateway
<rssi>	RSSI of tag/beacon

<raw packet content>	Raw packet received by the gateway
<unix epoch timestamp>	Optional timestamp configured in applications page

Report Type:

- $GPRP BLE4.2 General Purpose Report
- $RSPR BLE4.2 Scan Response Report
- $LRAD BLE5 Long Range ADV
- $LRSR BLE5 Long Range Scan Response
- $1MAD BLE5 1M ADV
- $1MSR BLE5 1M Scan Response

Examples:

$GPRP,CCB97E7361A4,CB412F0C8EDC,-49,1309696773206D65736820233220285445535429020106,1574921085
$GPRP,E5A706E3923A,CB412F0C8EDC,-87,0201041AFF5900021501122334455667788 99AABBCCDDEEFF0000100C3BB,157 4921085
$LRAD,51A88AD374B7,CC4B73906F96,-87,02010212FF0D0083BC280100AAAAFFFF000010030000,1574921085
$GPRP,0C61CFC1452E,E7DAE08E6FC3,-44,0201061AFF4C000215B9A5D27D56CC4E3AAB511F2153BCB9670001452ED6 (iBeacon, UUID: B9A5D27D56CC4E3AAB511F2153BCB967, Major: 0001, Minor: 452E)

GNSS (iGS03M)

General format:

$GPSR,<tag_mac>,<reader_mac>,<rssi>,yymmdd,hhmmss.ss,latitude,longitude,speed,hdop(,timestamp)

- “$GPSR,<tag_mac>,<reader_mac>,<rssi>” fields are for compatibility with other reports. The tag_mac is always the same as reader_mac and the rssi is always -127.
- yymmdd,hhmmss.ss is the UTC time when the position is acquired.
- speed: The unit is knotted.
- hop: Horizontal dilution of position

Example:
$GPSR,CC4B73906F96,CC4B73906F96,-127,191127,233821.00,24.993631,121.423264,0.0,2.4,1574897900

Button

One button is located on the back panel. It is used for WPS function or Reset to default settings.

Function	Trigger Condition
WPS (iGS03W/M)	short press for over 1sec and release
Reset to default settings	long press for over 3 sec

Reset to Default
Press the reset button on your device for over 3 secs to retrieve the default setting. While the network status LED turns into red light, release the button, and the iGS03M will reboot with its default settings.
WPS
Users can use the WPS button to join iGS03W/M to the WiFi Access Point. First press the WPS button on your Access Point, when it is ready, then press the WPS button for over 1 sec on the iGS03M device to join the Access Point.

LEDs

There are two LEDs indicating the current status. The left one is BLE status LED and the right one is Network status. Below are their behaviors.

	On	Flash
BLE Status LED	find tag/beacon in range	BLE transmission happening
Network Status L ED	WiFi/LTE-M connection success (This only implies the network is connected. It d oesn't mean the server is connected)	Green: WiFi/LTE-M network transmission happening Orange: If IGS03M does not insert SIM card and being used as WiFi device

Network Status LED behavior	**Description**	**Status**
ORANGE LED on (500ms)	Boot start	Booting
RED LED blink (100ms on/off)	Joining AP (If WiFi in STA mode)	Booting
RED LED blink (500ms on/off)	LTE connecting carrier	Booting
GREEN/ORANGE LEDs blink interleaved (100ms)	WPS enrollee	WPS
GREEN LED on	Network ready	Ready/Idle
ORANGE LED on	Network ready (If SIM card is not inserted)	Ready/Idle
GREEN LED blink (200ms on/off)	Network is transfering data (If SIM card is not used on iGS03M, shows ORAN GE LED blink instead)	Busy
RED LED ON (1sec)	Connect failure	Error
RED LED blink (5sec on/off)	Misconfiguration	Error
RED LED ON (5sec)	LTE init failure	Error

Configuration

To configure the unit, you have to connect it through the WiFi interface. When it is powered on, you could scan its native AP and connect it with the WiFi of your NB/PC/Mac/Tablet/Smartphone. Its SSID is just like the above figure with part of the mac address. The default key to connect with it is "12345678". You can change it later when you get into the web UI. After connection, enter IP address 192.168.10.1 in your browser. The default account/password are both "admin". The following sections describe details of the web UI.

Web User Interface

You can review the current configuration or modify it on the web UI. There are various function groups listed on the top of the UI.

Any change in the page needs to be saved first before switching to another page, otherwise, the modification will be lost. And after all changes are made, click reboot to make the changes effective.

System

Display firmware and device information, including MAC address and IP address in station mode are shown here.

Wi-Fi

Users can configure iGS03M's WiFi device as a WiFi AP or join to the other AP. The related settings can be managed on this page.

AP Mode

SSID: The default name is IGS03 plus the last digits of the mac address.
Security: Open, WPA-PSK, WPA2-PSK, and WPA-PSK/WPA2-PSK are supported. WPA2-PSK is recommended.
Password: 8-63 characters can be input
Channel: 1~11(ch12 and ch13 could be supported by request)

Station Mode

This mode is used for transferring data by *WiFi.
Scan: Click it to scan available APs.

The scan result list will be displayed on the popup window, and the user can choose the correct AP from the list.
SSID: No manual input required. It is automatically filled once a user chooses an AP from the scan result list.
Security: Basically it is automatically detected and selected after choosing an AP from the scan list. But in case the AP setting is in WEP open or WEP shared, the user has to confirm it by himself/herself.
Password: Type the one assigned in your AP.
Note: In data transfer, by default, WiFi has a higher priority than LTE. So for iGS03M if both interfaces are configured correctly and connected, the data will be transferred by WiFi. Users can change the priority through the Telnet command.

Network

WiFi Address (Device Address for IGS03E)

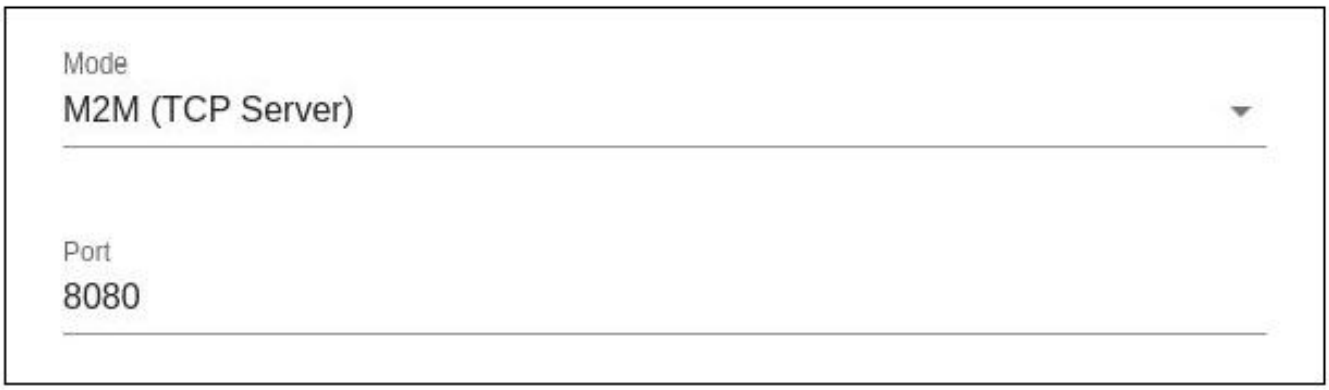
This setting is for configuring in WiFi Station mode or IGS03E. Normally the "DHCP Client" is used to obtain an IP Address from WiFi AP (or DHCP server for ethernet). If one wants to manually assign an IP address for iGS03, choose "Static IP" to assign the IP Address, Netmask, Gateway, and/or DNS servers.

DHCP Server (WiFi AP)

The default IP address of iGS03 in WiFi AP mode is 192.168.10.1 and the netmask is 255.255.255.0. In case the user wants to change the IP address in AP mode, just set the IP and Netmask here. The corresponding DHCP client address will be changed too. For example, if the DHCP server IP address is changed to 192.168.0.1., the DHCP clients associated with iGS03 AP will be 192.18.0.X.

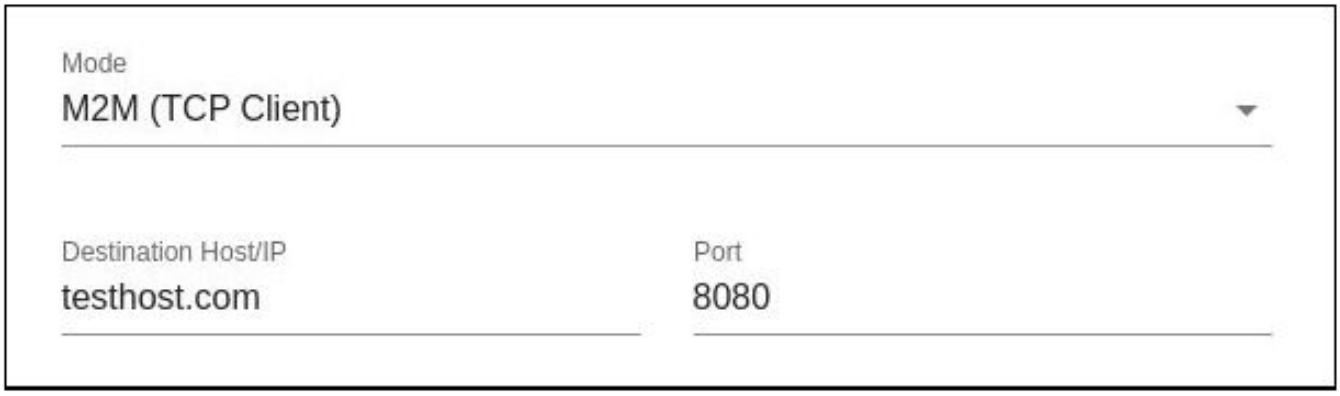
Applications

TCP Server



This mode is mainly for testing purposes. Users can check the received data immediately via connecting to the TCP server through the WiFi interface.

TCP Client

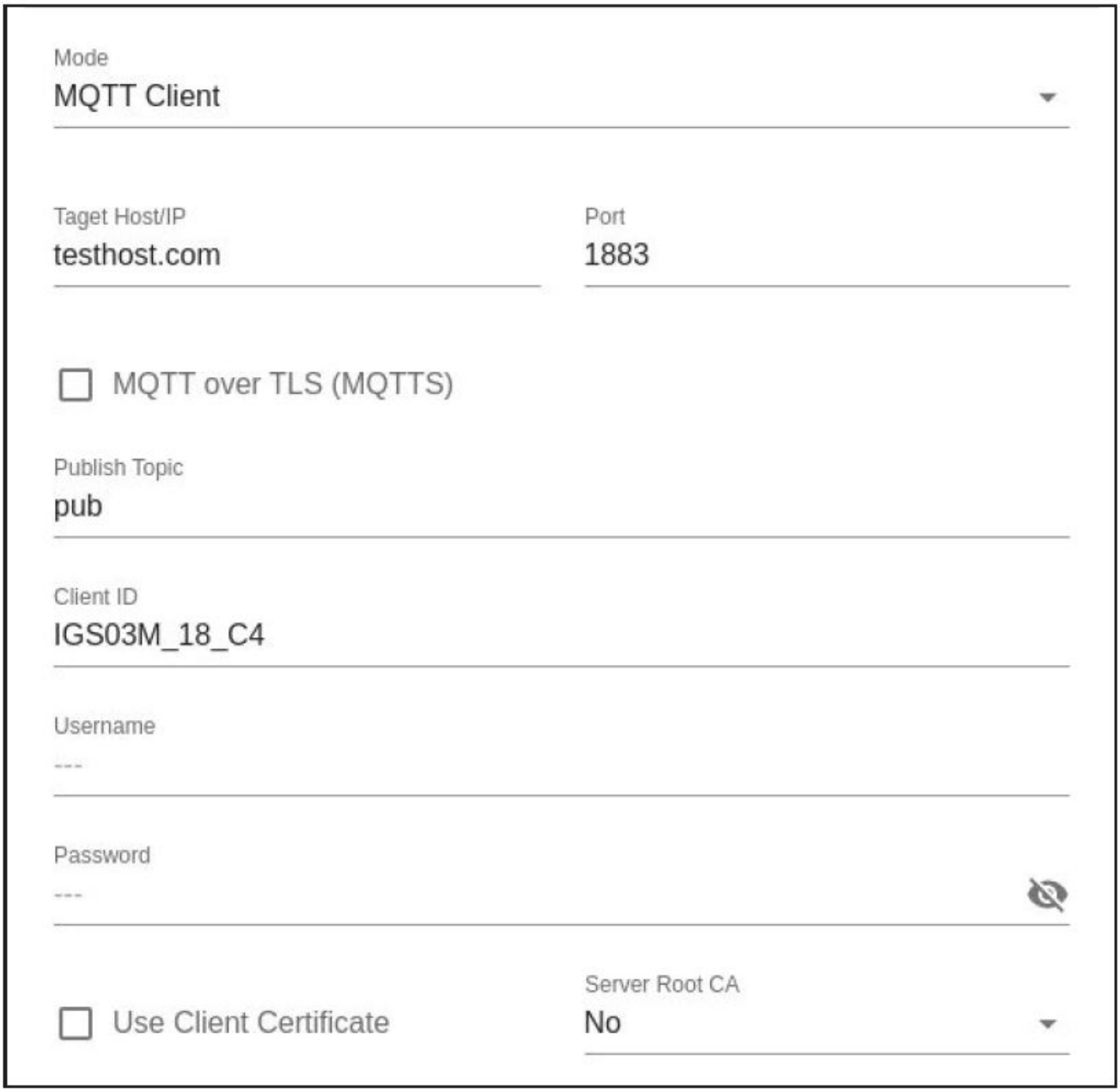


iGS03 plays as a TCP client to communicate with a raw TCP server. Enter the address and port number of the TCP server to connect it.

HTTP Client

Another connection in the application is through setting iGS03 as an HTTP client. In this scenario, one has to assign the HTTP URL to bring the BLE data to the HTTP server through the gateway. Some HTTP servers may need a username and password. The others may need an extra header and value. Users can simply use https://in the URL to enable HTTPS. And users can also enable Server Root CA/User Client Certificate based on the server requirement. The certificate files can be uploaded on the Security page.

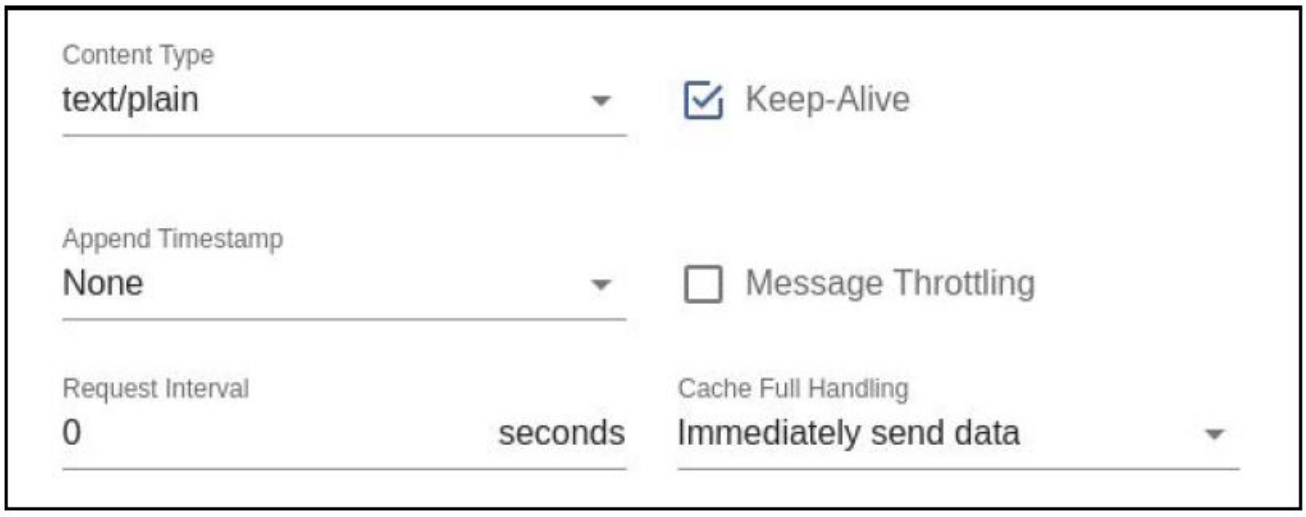
MQTT Client



Configure iGS03 to connect the MQTT broker for publishing data. In this scenario, one has to assign the MQTT host address and port number. Also, the published topic needs to be assigned. Client ID is default assigned as the gateway name with part of the MAC address, users can change it as well. If the Client ID is not set, the system will generate a random number for it. Username and password are optional. Users can enable MQTTS support. And also can enable Server Root CA/Use Client Certificate based on the server requirement. For example, to enable AWS-IoT, the user has to enable MQTTS/ROOT CA/ Use Certificate options and upload the certificate and private key in the security page.

Common Settings

Content-Type



Users can choose the report data in plain text format or JSON string.

Keep-Alive

This option is available for HTTP clients. The device will use an HTTP persistent connection to reuse existing tcp sessions. This enhances HTTP efficiency.

Append Timestamp

Devices add the timestamp information in the BLE package format as stated on the page. Users can choose to use the unit in seconds or milliseconds. If the device did not enable NTP time synchronization or the NTP server is unreachable, the reported timestamp will be unexpected.

Request Interval

One can also assign the request interval to upload the data to the server. This is useful for reducing data connections. When the interval is set as 0, the data will be sent immediately. When it is set as a non-zero value in second, the data will be sent whenever the buffer is full (depends on the Cache full handling option) or the time interval is reached.

Cache full handling

The iGS03 has a limited cache buffer. The user needs to decide “send data immediately” or “discard new input data” if the cache is full.

- If the user selects “sending data immediately”, the device will keep on uploading data when cache is full to avoid data loss regardless of your ”request interval setting”. That will cause more data traffic.
- If the user selects “discard new input data”, the device will not send data before reaching the request interval.

Throttle Control

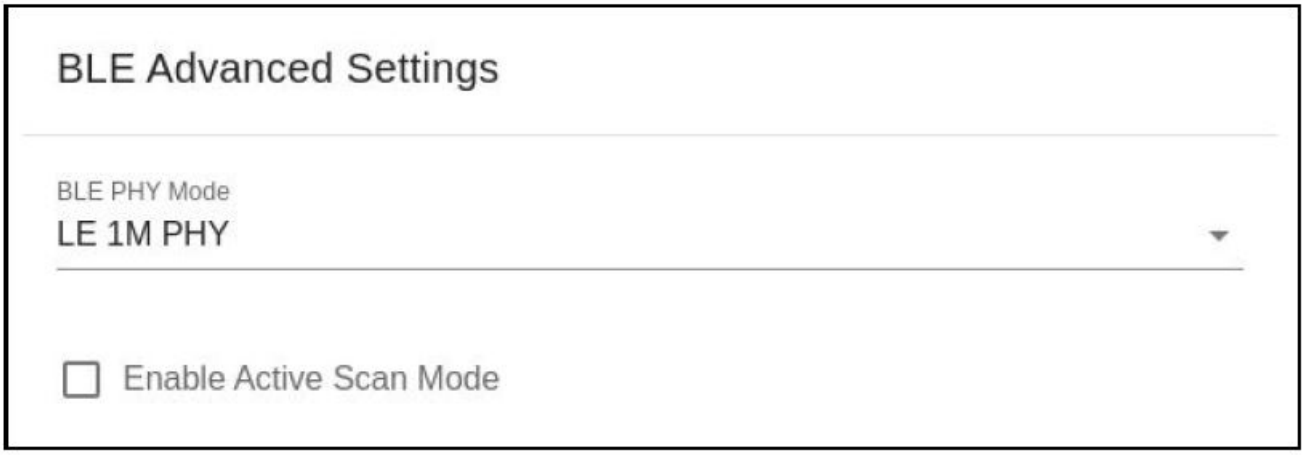
If throttle control is enabled, iGS03 will keep the last record for each TAG/Beacon ID in the given interval (request interval). In this way, one can reduce the data transmission to the server.

Cloud IoT Helper

The cloud IoT helper can be launched by the “magic wand”, it is used to assist users to configure AWS IoT, Azure IoT or Google Cloud IoT usage.

Advanced

BLE Configuration

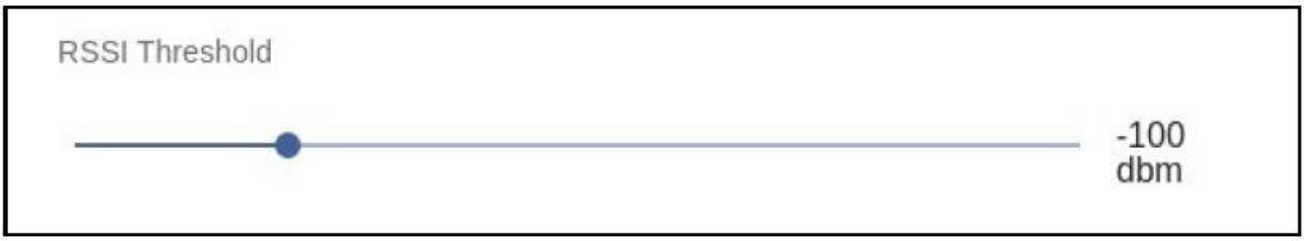


BLE PHY Mode
Users can choose to use LE 1M PHY or LE Coded PHY (Long-Range Mode).
Active Scan Mode
Enable active scanning.

BLE Filter

Users can set the BLE filter to filter out the unwanted BLE advertising data. There are three kinds of filters supported by iGS03.

RSSI Threshold



If the bar is pulled right to -50dBm, only the BLE tag/beacon with RSSI larger than or equal to -50dBm will be transmitted to the server.

Payload Whitelist

Set patterns to configure the BLE payload whitelist. Devices will only report the BLE payload which matches one of the patterns. Click on the “plus” button to add a new pattern. The character ‘X’ in the pattern means ignore the character. Also, you can click the “magic wand” to select a preset pattern for iBeacon, Eddystone, or NICS beacons. Users can set up to 6 entries of the payload filter to make sure only relevant information is received. If the pattern list is empty, it means the payload whitelist function is disabled, all payloads will be allowed.

BLE MAC Whitelist

Set BLE beacon MAC addresses to configure the BLE MAC whitelist. Gateway will only report the advertising data broadcasted from the beacons which match the whitelist. Users can set up to 10 MACs to make sure only relevant information is received. If the list is empty, it means the BLE MAC whitelist function is disabled. All BLE beacons are allowed.

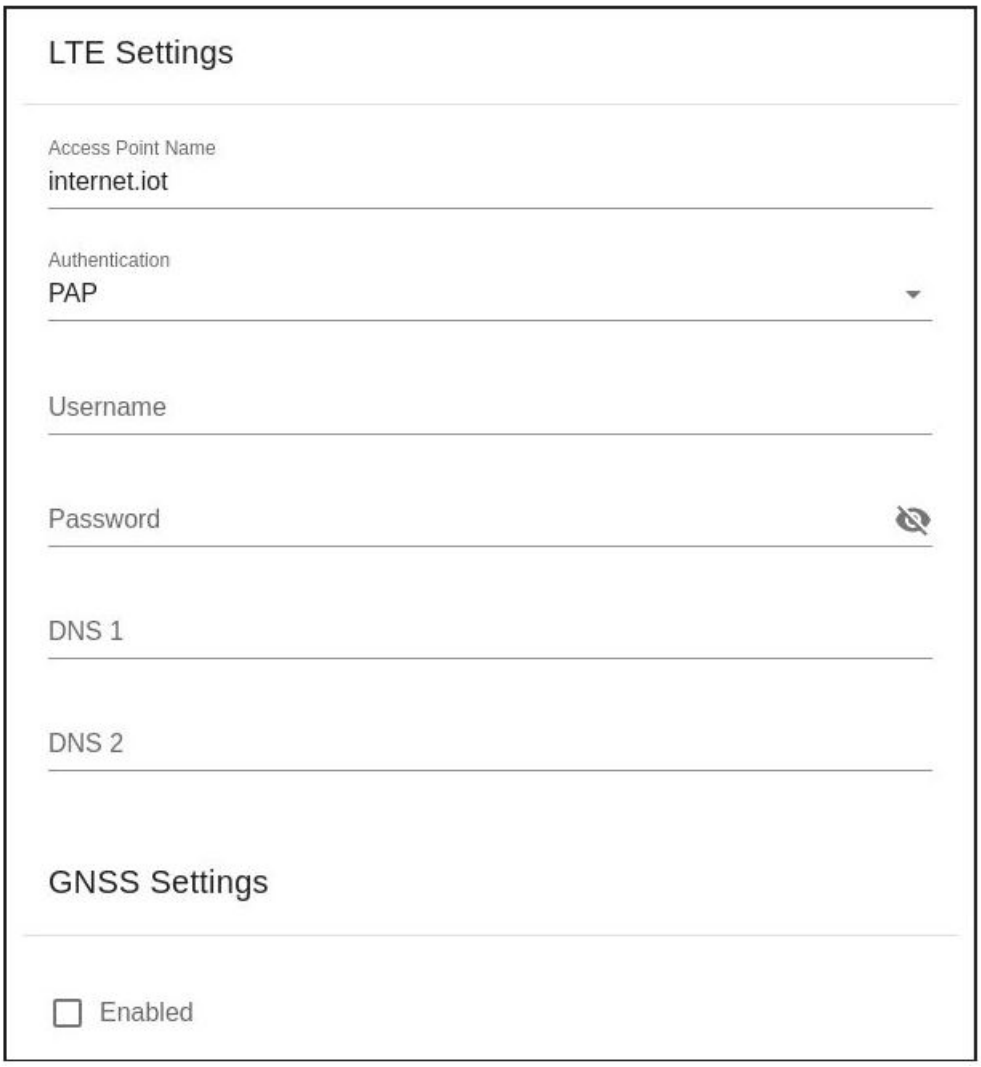
Security

Device Key/Certification/Server CA Upload

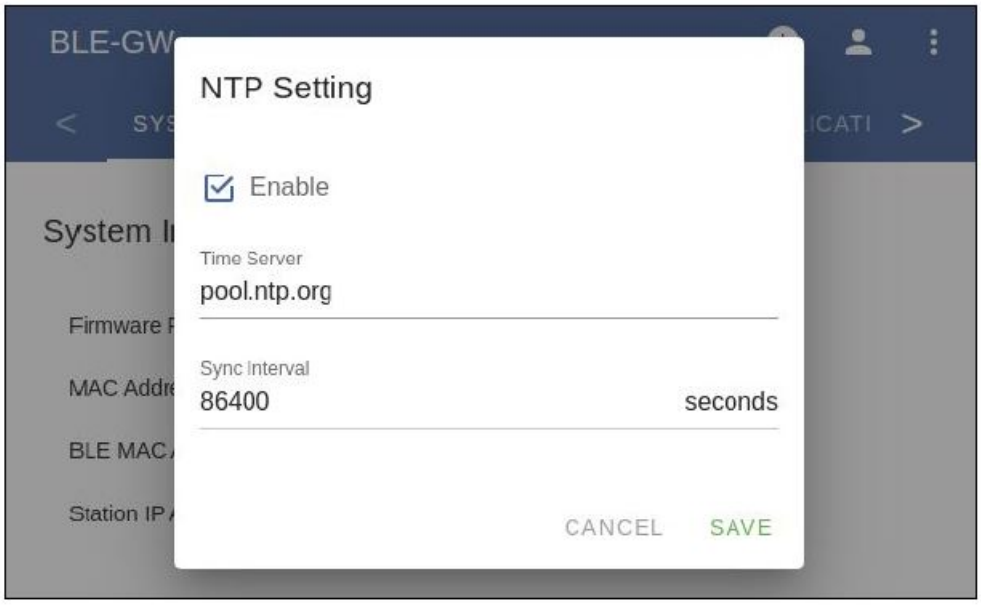
Users can upload device certification, private key and server CA files in PEM format on this page. All these files may be used by MQTTS or HTTPS functions.

LTE

LET Settings

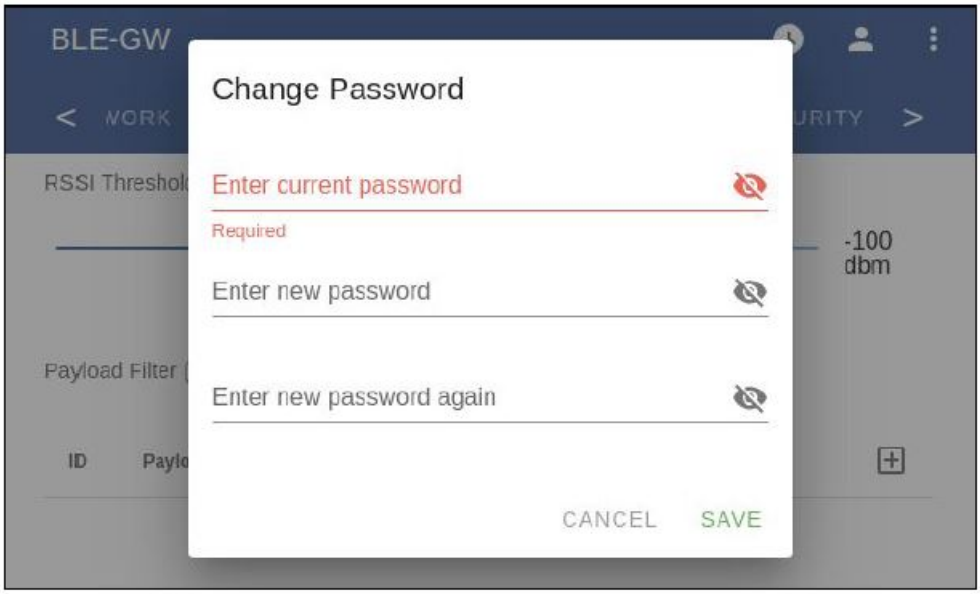


Access Point Name
The APN setting for the carrier setting.
Authentication
The auth type is based on the carrier setting.
Username/Password
The username/password is based on the carrier setting.
DNS Servers
In case the users want to specify/her own DNS servers.
GNSS Settings
Users can enable the GNSS function here.
NTP Setting



To open the NTP Setting UI, click the “clock” icon in the UI header. The user has to set the time server and the update period to enable NTP.

Login Password



One can change the login password from the “people” icon on the UI header. Be aware that it changes the login password of the telnet console, too.

Certification

Bluetooth SIG Qualification

Model number: iGS03W/iGS03M **Declaration ID:** D048813 **Description:** Beacon gateway

Japan MIC Regulatory

iGS03W with below-certified number 201-200584, 217-204070 iGS03M with below certified number 201-200584, 217-204070, 003-180062, D180034003

FCC Regulatory

iGS03W iGS03M

FCC ID:2AH2IIGS03W contains FCC ID:2AH2IIGS03W contains

FCC ID:2AC7Z-ESP32WROOM32E FCC ID:2AC7Z-ESP32WROOM32E

FCC Statements

Federal Communication Commission Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example – use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement
This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation

CE Regulatory
iGS03W/M has been tested and complies with the essential requirements of the DIRECTIVE 2014/53/EU and DIRECTIVE 2014/35/EU. Below is the copy of CE Conformity of Declaration.

DECLARATION OF CONFORMITY

Under EU RED - DIRECTIVE 2014/53/EU -
Under EU-LOW VOLTAGE DIRECTIVE 2014/35/EU

This declares that the following designated product

LTE Beacon Gateway
Model No.: iGS03W
Brand Name: INGICS

(Product identification)

complies with the essential requirements of the EU RED - DIRECTIVE 2014/53/EU, EU-LOW VOLTAGE DIRECTIVE 2014/35/EU on the approximation of the laws of the Member States relating to ***Radio Spectrum Matters/RF Exposure/Health Matters.***
Assessment of compliance of the product with the requirements relating to radio spectrum matters was based on Annex IV of the Directive 2014/53/EU and the following standard:

EMC	Radio Spectrum	Safety
EN 301 489-1: V 2.2.3 (2019-11) EN 301 489-17: V 3.2.4 (2020-09)	EN 300 328: V 2.2.2 (2019-07)	IEC 62368-1: 2014/COR1:2015 and EN 62368-1: 2014/A11:2017
		Health EN 62311 (2020)

(Identification of regulations / standards)

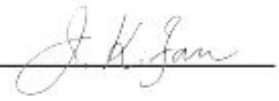
This declaration is issued by

INGICS TECHNOLOGY.
2F., No.15-2, Changshou St.,
Shulin Dist., New Taipei City 238,, Taiwan, R.O.C.

(Name / Address)

Furthermore we declare that our product will be produced in correspondence with all requirements according to the Directive 2014/53/EU and LOW VOLTAGE DIRECTIVE 2014/35/EU.

Name: J.K.Fan Title: President

Signature 

Date: 2020. 11.16

DECLARATION OF CONFORMITY

Under EU RED - DIRECTIVE 2014/53/EU -
Under EU-LOW VOLTAGE DIRECTIVE 2014/35/EU

This declares that the following designated product

LTE Beacon Gateway
Model No.: iGS03M
Brand Name: INGICS

(Product identification)

complies with the essential requirements of the EU RED - DIRECTIVE 2014/53/EU, EU-LOW VOLTAGE DIRECTIVE 2014/35/EU on the approximation of the laws of the Member States relating to ***Radio Spectrum Matters/RF Exposure/Health Matters.***
Assessment of compliance of the product with the requirements relating to radio spectrum matters was based on Annex IV of the Directive 2014/53/EU and the following standard:

EMC	Radio Spectrum	Safety
EN 301 489-1: V 2.2.3 (2019-11)	EN 300 328: V 2.2.2 (2019-07)	IEC 62368-1: 2014/COR1:2015
EN 301 489-17: V 3.2.4 (2020-09)	EN 303 413: V1.1.1 (2017-06)	and EN 62368-1: 2014/A11:2017
EN 301 489-19: V 2.1.1 (2019-04)	EN 301 908-1: V13.1.1 (2019-11)	
EN 301 489-52: V 1.1.0 (2016-11) Draft		Health
		EN 50385 (2017)

(Identification of regulations / standards)

This declaration is issued by

INGICS TECHNOLOGY.
2F., No.15-2, Changshou St.,
Shulin Dist., New Taipei City 238,, Taiwan, R.O.C.

(Name / Address)

Furthermore we declare that our product will be produced in correspondence with all requirements according to the Directive 2014/53/EU and LOW VOLTAGE DIRECTIVE 2014/35/EU.

Name: J.K.Fan Title: President

Signature 

Date: 2020. 11.16

Revision History

DATE	REVISION	CHANGES
Dec 3, 2019	0a	Initial release
Apr 6, 2020	0b	Update screenshots
Jun 3, 2020	0c	Update photo and diagram
Jul 7, 2020	0d	Update LED behavior
Sep 24, 2020	01	Fix text and layout
Nov 17, 2020	01a	1. Add FCC/CE regulatory information and FCC statement 2. Add the method of opening the lower cover 3. Modify Button section to make it more clear 4. Update insert SIM card location photo

Documents / Resources

	INGICS TECHNOLOGY iGS03W Beacon Gateway [pdf] User Manual IGS03E, 2AH2IIGS03E, iGS03W Beacon Gateway, iGS03W, Beacon Gateway
	Ingics Technology iGS03W Beacon Gateway [pdf] User Guide IGS03W, 2AH2IIGS03W, iGS03W Beacon Gateway, Beacon Gateway