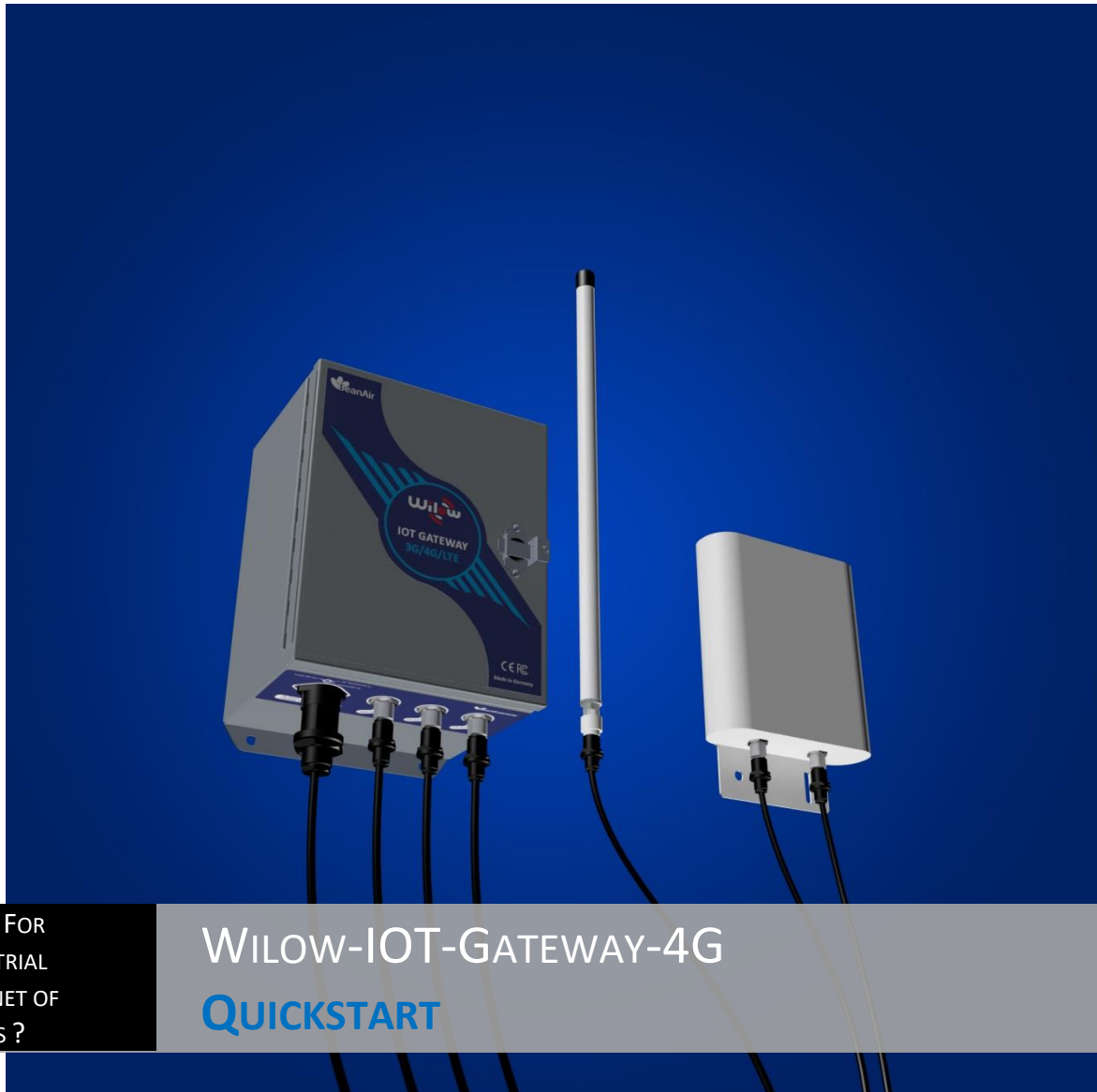




Version 1.0



READY FOR
INDUSTRIAL
INTERNET OF
THINGS ?

WILOW-IOT-GATEWAY-4G QUICKSTART





Ready for Industrial Internet of Things ?

Document version : 1.0

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BeanDevice® WiLow® Quickstart

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1. TECHNICAL SUPPORT

For general contact, technical support, to report documentation errors and to order manuals, contact **BeanAir Technical Support Center** (BTSC) at:
tech-support@beanair.com

For detailed information about where you can buy the BeanAir equipment/software or for recommendations on accessories and components visit:




www.beanair.com

To register for product news and announcements or for product questions contact BeanAir's Technical Support Center (BTSC).

Our aim is to make this user manual as helpful as possible. Please keep us informed of your comments and suggestions for improvements. BeanAir appreciates feedback from the users.



2. VISUAL SYMBOLS DEFINITION

<i>Symbols</i>	<i>Definition</i>
	<i><u>Caution or Warning</u> – Alerts the user with important information about BeanAir wireless sensor networks (WSN), if this information is not followed, the equipment /software may fail or malfunction.</i>
	<i><u>Danger</u> – This information MUST be followed if not you may damage the equipment permanently or bodily injury may occur.</i>
	<i><u>Tip or Information</u> – Provides advice and suggestions that may be useful when installing BeanAir Wireless Sensor Networks.</i>





3. ACRONYMS AND ABBREVIATIONS

AES	Advanced Encryption Standard
CCA	Clear Channel Assessment
CSMA/CA	Carrier Sense Multiple Access/Collision Avoidance
GTS	Guaranteed Time-Slot
kSps	Kilo samples per second
LDCDA	Low duty cycle data acquisition
LLC	Logical Link Control
LQI	Link quality indicator
MAC	Media Access Control
PER	Packet error rate
POE	Power Over Ethernet
RF	Radio Frequency
SD	Secure Digital
UPS	Uninterruptible power supply
USB OTG	USB On The Go
WDAQ	Wireless DAQ
WSN	Wireless Sensor Networks



4. PRODUCT OVERVIEW

Wilow® IOT Gateway along with BeanScape® RA will provide you a ready to use one packaged solution for remote access monitoring using BeanDevice Wilow.

Communication between Wilow® IOT Gateway and Real time office monitoring site (using BeanScape® RA supervision software) will be supported with 3G/4G channel.

Data transmission is managed using MQTT lightweight protocol with the Wilow® IoT Gateway hosting the MQTT broker.



Figure 1: IoT Gateway 4G

4.1 ACCESSORIES

In addition to the Wilow® IoT gateway you will find inside the packet a list of accessories:

- 4G/LTE Antenna
- WiFi Antenna
- External cable for Wifi antenna
- External cable for 4G/LTE antenna
- Power supply plug



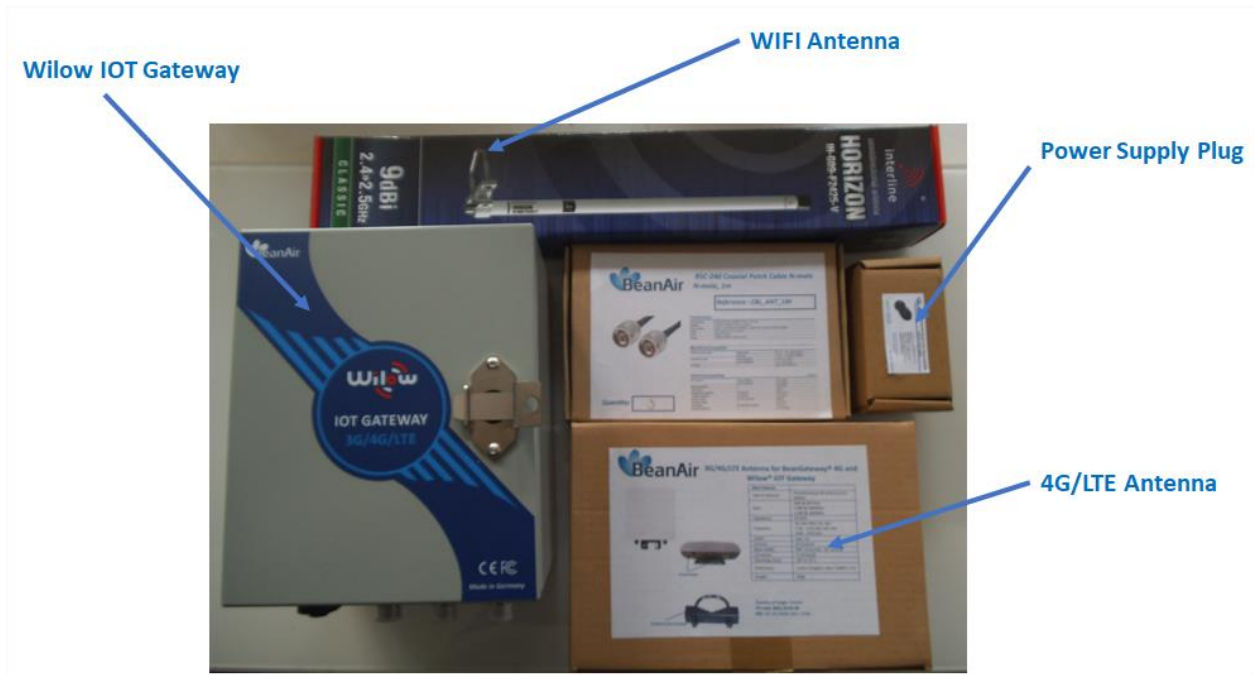


Figure 2: IoT Gateway package with accessories



[For more info on the accessories and its specification, please refer to the user manual, click here](#)



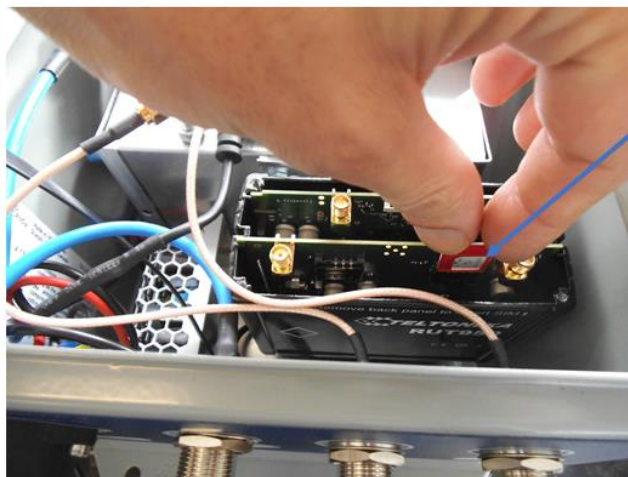
5. INSTALLATION

1. Firstly, use the supplied antennas cables and power supply cable to connect to the appropriate connector as shown below in the figure



Figure 3 : Antenna and power supply connectors

2. Open the enclosure and use the Ethernet cable to connect to your Laptop in order to configure the IoT Gateway and get it ready for remote monitoring ,as well to insert SIM card. use a screwdriver to remove the black lid and properly insert the SIM card(Figure 4)



Insert SIM card inside the SIM Slot 1

SIM card is inserted with the notch-end on the top-left side

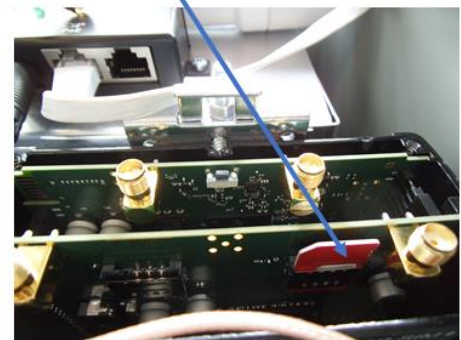


Figure 4 : inserting SIM card



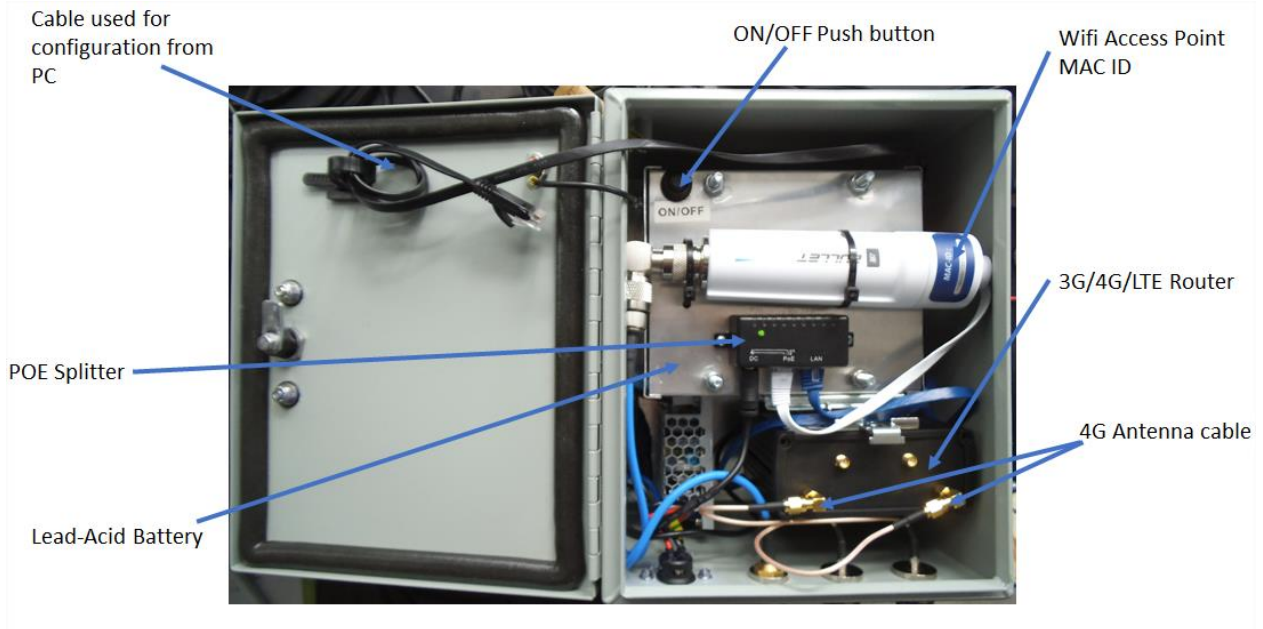


Figure 5: Wilow IoT Gateway



[For more information you can to our lot Gateway user guide,Click here!](#)

5.1 SYSTEM CONFIGURATION

IoT Gateway 4G comes initially configured , you don't need to do much, but in case you need to restore everything to factory default after things goes wrong,you can find all the settings described in Appendix 1 & Appendix 2 in the [user manual](#) .



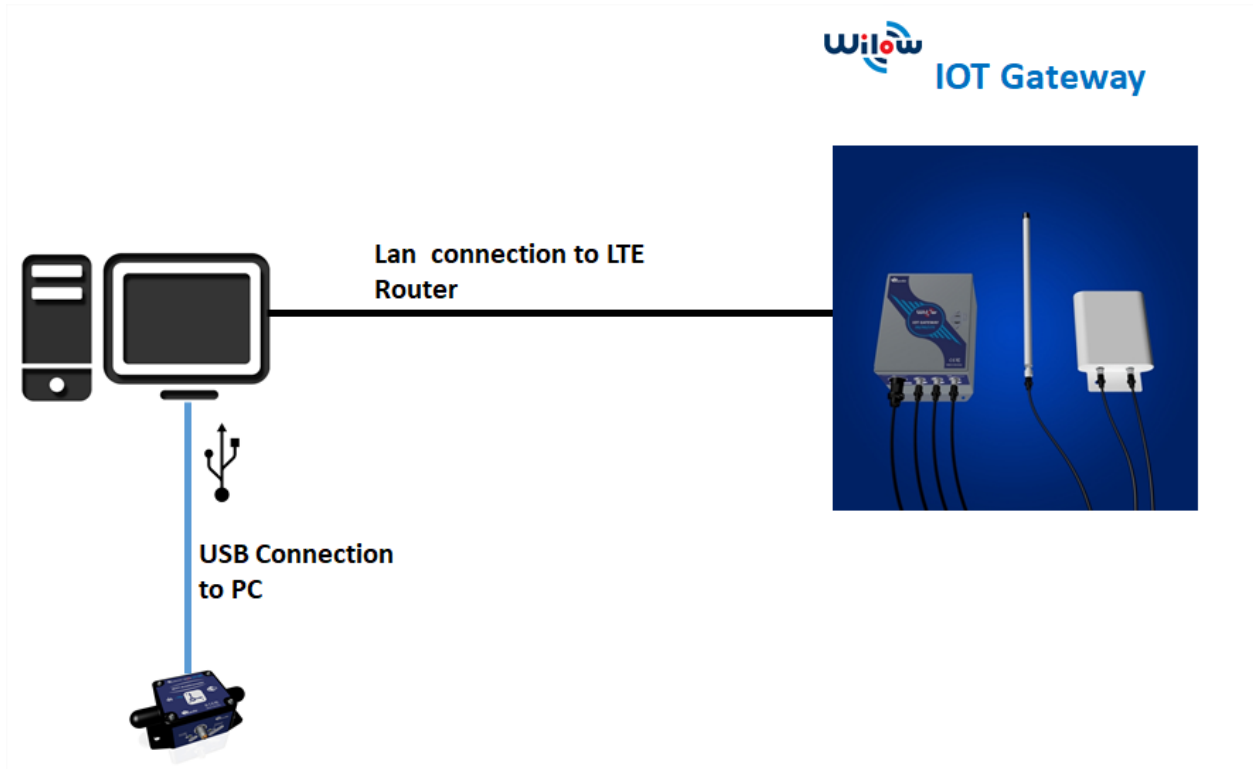
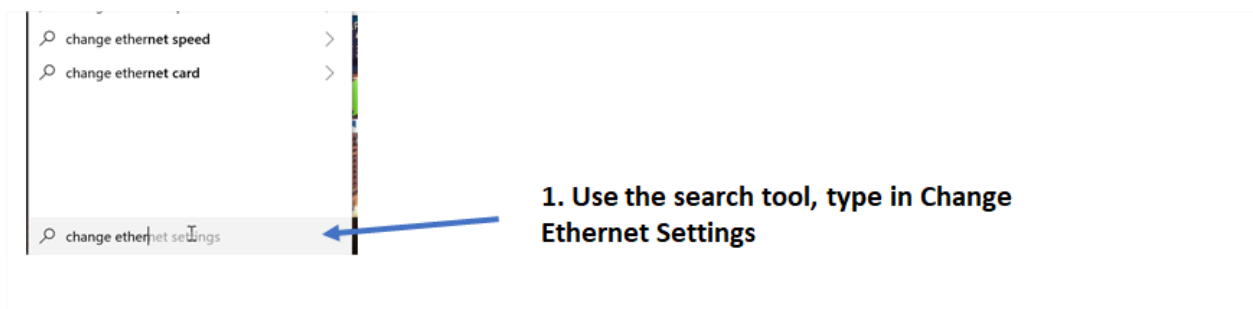
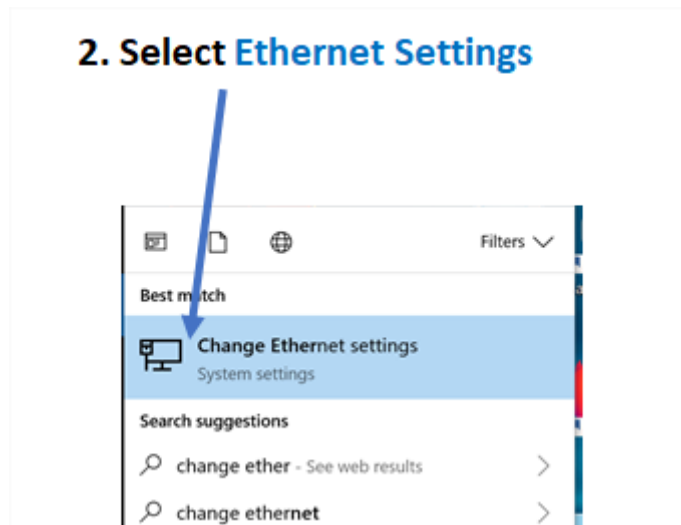


Figure 6 :network configuration setup

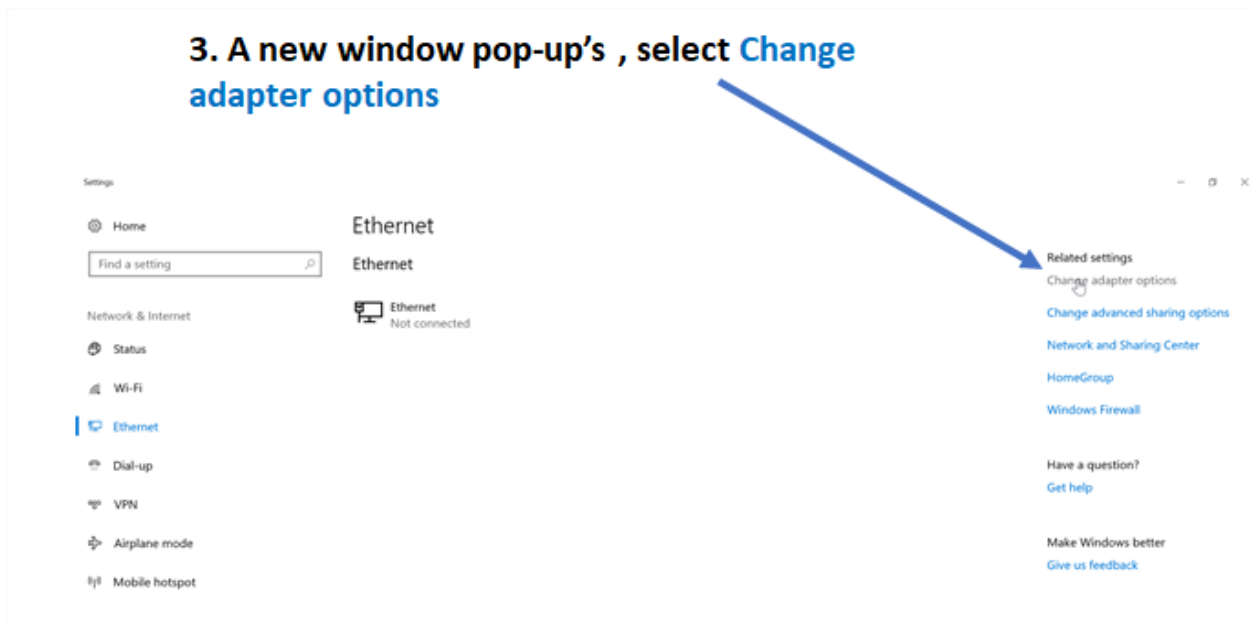
You need to set up a local IP address that's in the same subnet as the IoT Gateway which comes by default set to **192.168.1.243**, use any ip in the form of **192.168.1.XXX** where **XXX** is a number from **2** to **254**. avoid using the same IP address as the IoT Gateway®.



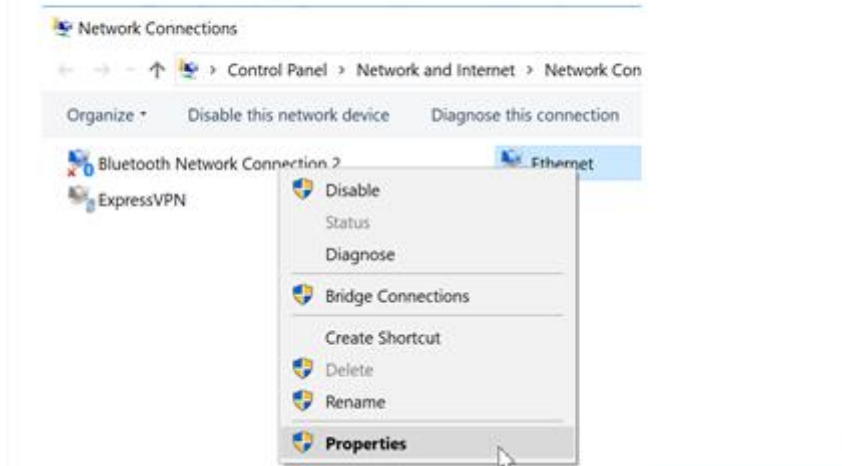
2. Select Ethernet Settings



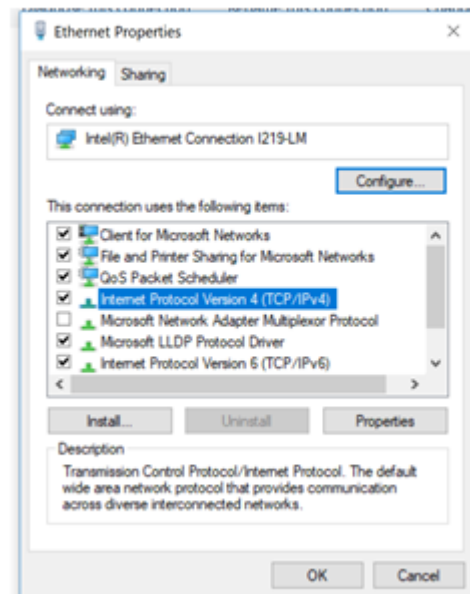
3. A new window pop-up's , select **Change adapter options**



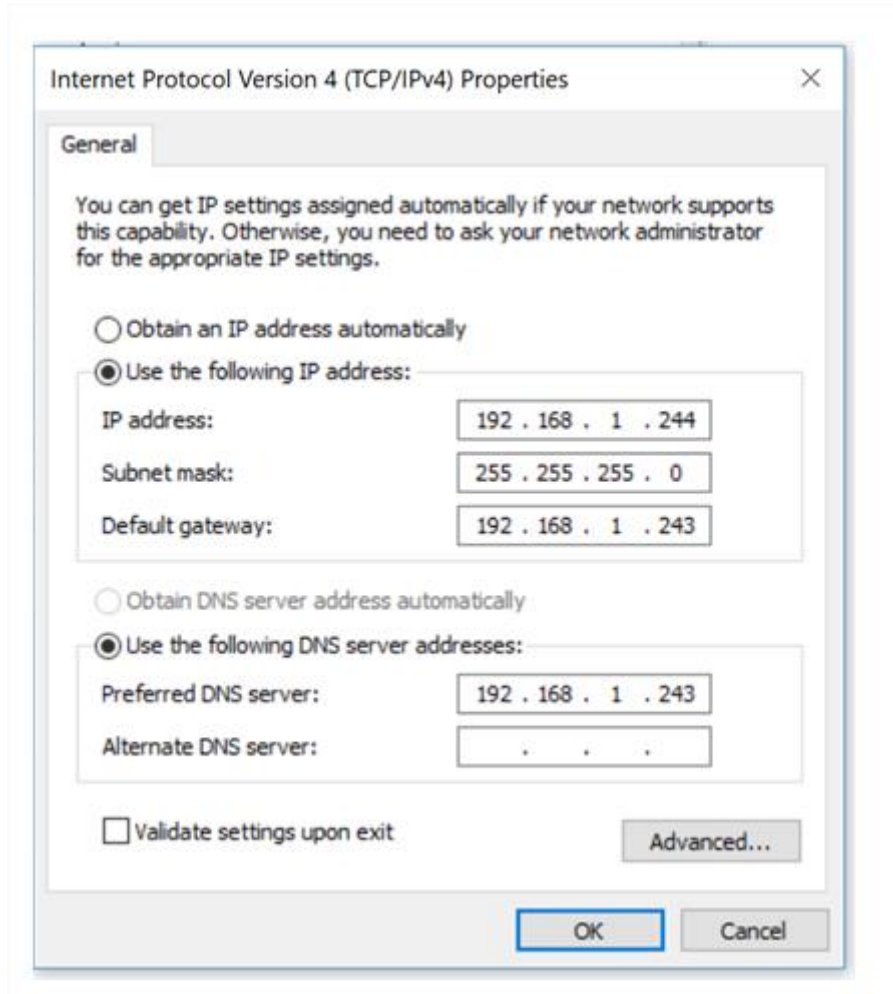
4. right click on your Ethernet device which is connected to your 4G Router



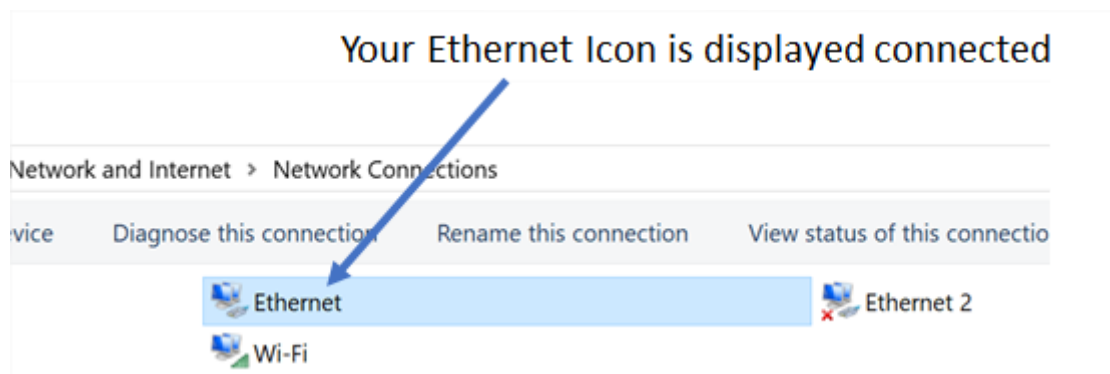
5. Click on Properties, then select Internet Protocol Version 4 (TCP/IPv4) then click on Properties



- Enter any ip in the form of **192.168.1.XXX** where **XXX** is a number from **2** to **254**
- Enter 255.255.255.0 for your subnet mask
- The default gateway must come with the same IP address that your 4G Router **192.168.1.243**
- Finally enter primary DNS server IP , the same than your 4G Router IP **192.168.1.1**
- Click on OK validate your configuration



Your Ethernet Icon is displayed connected



In order to access the router and make sure the SIM card, the MQTT broker are configured correctly and also to check on the connection and signal quality status, you need to use your browser on your PC and log in to the router using :

- IP address: **192.168.1.243**
- Username: **admin** | password: **admin01**

5.1.1 Sim card configuration

For configuring your 4G/LTE Router go on Network then Click on Mobile

The screenshot shows the 'Mobile Configuration' page with several sections and fields. Blue arrows point from text annotations to specific fields:

- Connection type:** Set to 'QMI'. Annotation: "The connection type used when connecting to a network. It can either be PPP or QMI. PPP is considerably slower than QMI. QMI is highly recommended".
- Mode:** Set to 'NAT'. Annotation: "Access Point Name (APN) is a configurable network identifier used by a mobile device when connecting to a GSM carrier." (This annotation points to the APN field).
- APN:** Set to 'internet'. Annotation: "Fill out this field only if your SIM card has PIN enabled".
- PIN number:** Set to '0901'. Annotation: "Fill out this field only if your SIM card has PIN enabled".
- Dialing number:** Set to '*99#'. Annotation: "Leave this field empty".
- MTU:** Set to '1500'. Annotation: "No need to fill out this field".
- Authentication method:** Set to 'None'. Annotation: "Leave this field empty".
- Service mode:** Set to 'Automatic'. Annotation: "Leave this field empty".
- Deny data roaming:** Unchecked. Annotation: "If enabled this function prevents the device from establishing mobile data connection while not in home network.".
- Use IPv4 only:** Checked. Annotation: "This box is checked by default".

Below the main configuration are three sections:

- Mobile Data On Demand:** Enable . No data timeout (sec) .
- Force LTE network:** Enable . Reregister . Interval (sec) .

A 'Save' button is located at the bottom right of the configuration area.





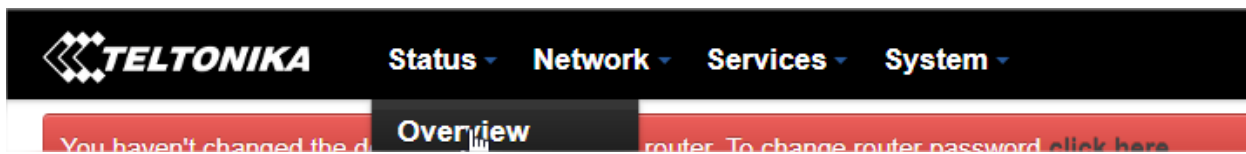
You can get the APN ID from your telecom operator provider






If an invalid PIN number was entered (i.e. the entered PIN does not match the one that was used to protect the SIM card), your SIM card will get blocked. To avoid such mishaps, it is highly advised to use an unprotected SIM. If you happen to insert a protected SIM and the PIN number is incorrect, your card won't get blocked immediately, although after a couple of reboots OR configuration saves it will.

5.1.2 Mobile status

You can check on your Mobile status by clicking on the Status tab and then Overview.



You can view your data connection duration and quality of connectivity, whether you are registered and using 4G or not .you will also monitor the received and sent bytes.

Mobile  	-54 dBm 
Data connection	0d 0h 43m 0s (since 2018-08-09, 13:10:13)
State	Registered (home); TUNTEL; 4G (LTE)
SIM card slot in use	SIM 1 (Ready)
Bytes received/sent *	105.5 MB / 4.9 MB

5.1.3 MQTT Broker

lot Gateway 4G comes with integrated MQTT broker that will serve all the subscribed clients and help publish data from the BeanDevices to all listening subscribers.



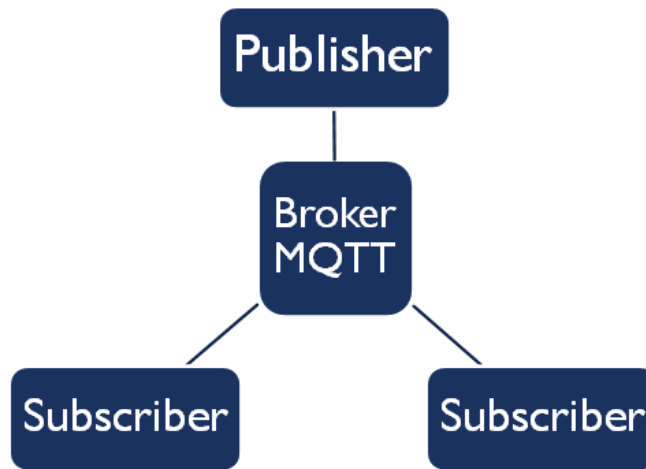


Figure 7: MQTT Architecture

Under services tab ,go to MQTT Broker and make sure it is enabled and using Local port 1883(make sure this port is not used by other application)

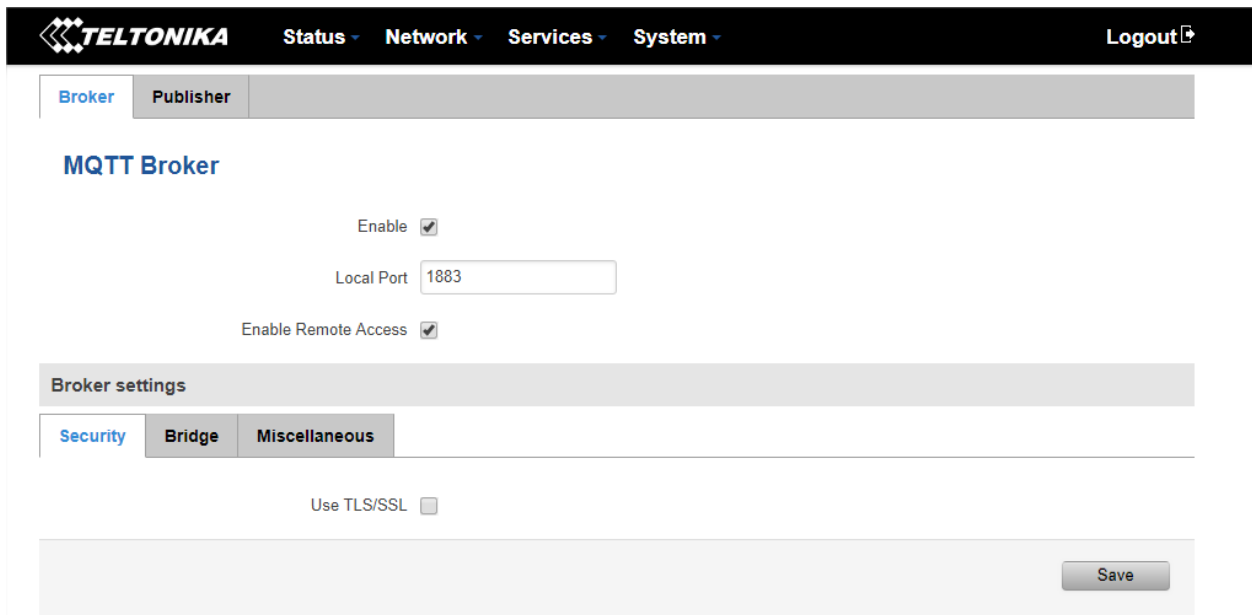


Figure 8 : MQTT Broker configuration

To make sure the MQTT broker in the Wilow® IOT Gateway® is working fine, try to ping to it (using its Public IP address you find in WAN) from a different network.



```
Command Prompt
C:\Users\info>ping 197.9.152.175

Pinging 197.9.152.175 with 32 bytes of data:
Reply from 197.9.152.175: bytes=32 time<1ms TTL=64
Reply from 197.9.152.175: bytes=32 time<1ms TTL=64
Reply from 197.9.152.175: bytes=32 time<1ms TTL=64
Reply from 197.9.152.175: bytes=32 time<1ms TTL=64

Ping statistics for 197.9.152.175:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\info>
```

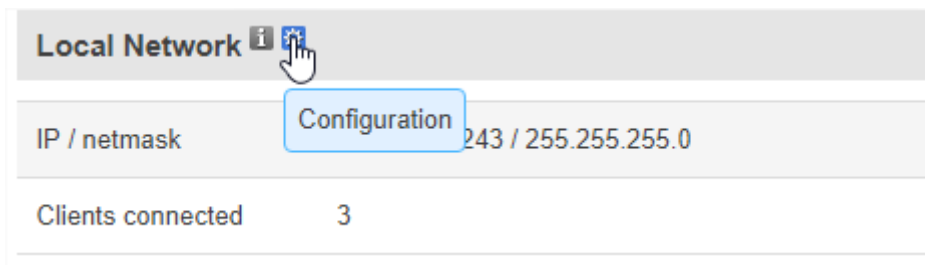
Also make sure PORT 1883 is not used by another application.

```
C:\WINDOWS\system32>netstat -np TCP | find "1883"

C:\WINDOWS\system32>
```

5.1.4 LAN

LAN IP address should be [192.168.243](#) by default and if this is not the case for whatever reason ,you will need to set it back to [192.168.1.243](#) in the configuration panel you can find in the overview page



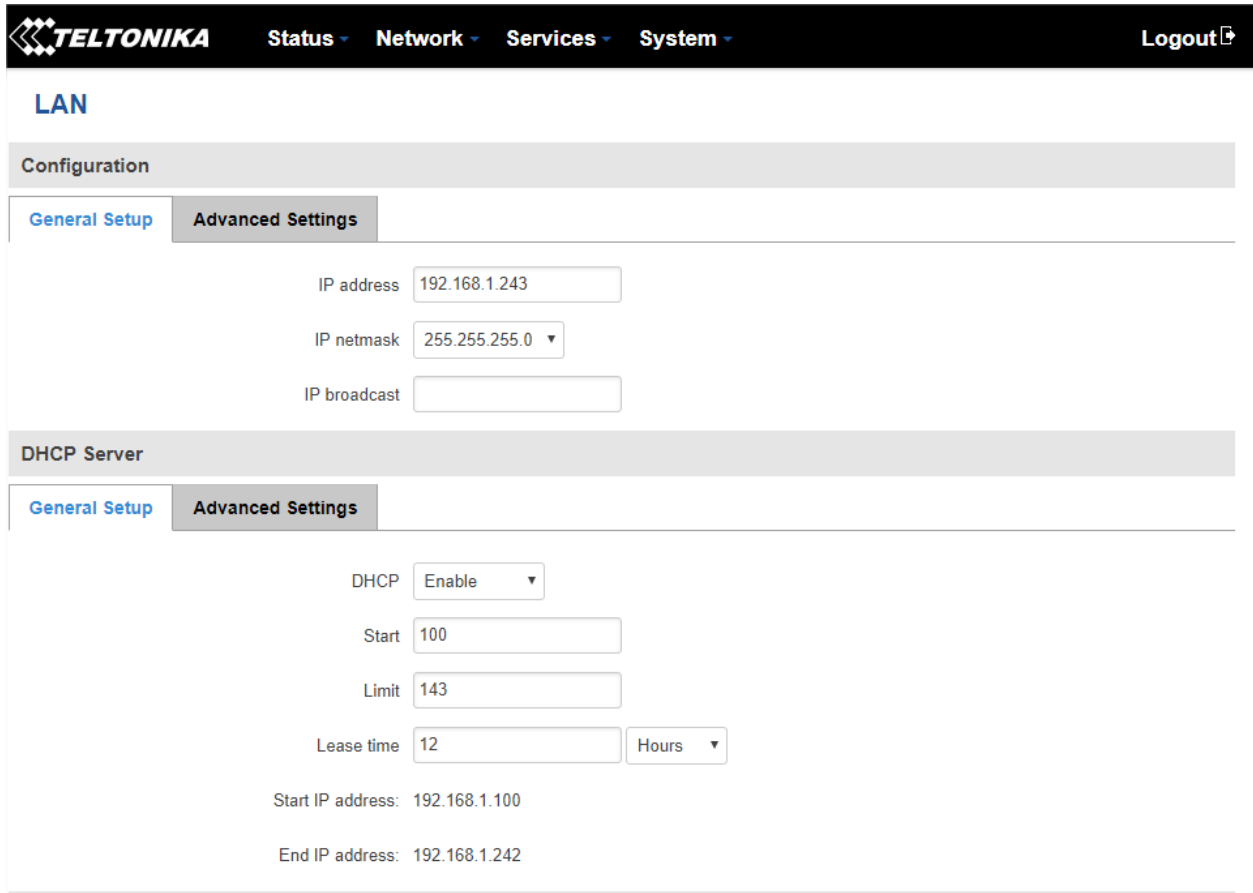


Figure 9 : LAN configuration

5.1.5 WiFi Access point

Wilow® IOT Gateway integrates a high gain WIFI Access point. This access point is already configured with the following settings:

AP IP address	192.168.1.20
AP Webserver Login	Ubnt
AP Webserver PW	beanair
WIFI SSID	beanair
WIFI Password	Beanair2018
Encryption	WPA2-AES



<i>WIFI RF Channel</i>	2437
<i>AirMax function</i>	disabled



If you need to change the WIFI AP settings or if you need to reconfigure it after factory settings restoration go to the [Appendix 1 on the user manual](#)

5.2 BEANDEVICE® WILOW® CONFIGURATION

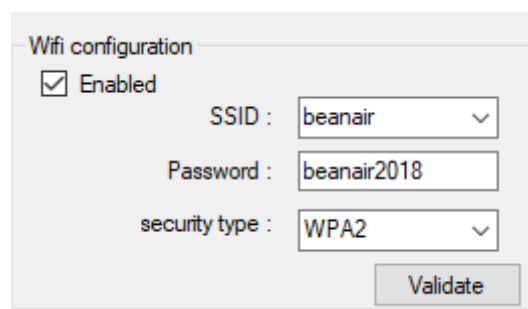
Now, after having a functional IoT Gateway we have to assign the configure the BeanDevice Wilow to connect to it and use its MQTT broker to publish its measurement data, so it will be monitored remotely using a connected BeanScape RA .

- To setup the MQTT Publisher on your BeanDevice® Wilow®, it needs to be [connected locally using TCP Connection](#) first, once the BeanDevice® is connected to our WIFI network we can start configuring MQTT settings,
- After turning on your BeanDevice® Wilow® using the magnet go to BeanScape® supervision software Wilow® Wlan/LAN configuration window (Tools → Wlan/LAN configuration), enter the default network settings and click on validate.



The WIFI AP on the Wilow® IoT Gateway comes with the following WIFI configuration:

- **Default SSID: beanair**
- **Password: beanair2018**
- **security type: WPA2**



Wifi configuration

Enabled

SSID :

Password :

security type :

Figure 10 :WiFi settings





[See our Technical video Getting started with BeanDevice® Wilow®](#)



[For more information how to connect BeanDevice® Wilow® to Wi-Fi network . Please refer to the user manual at page 48](#)

Next, start MQTT configuration panel on **BeanDevice®** tab

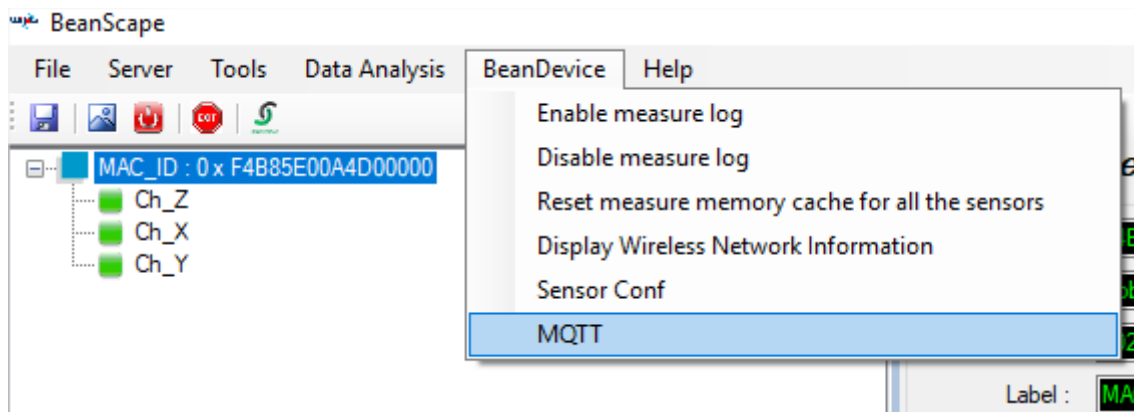


Figure 11 :BeanDevice Wilow MQTT configuration

MQTT configuration window will pop up:



Figure 12 :MQTT configuration window

Follow these following screenshots and fill in your settings, then validate.



[Please Refer to the IoT Gateway user manual for more details](#)



Here you can check your MQTT different status, connected, stopped , connecting or disconnecting and can start your connection from here.

MQTTSTATUS

MQTT Status:

MQTT Ack:

LDC topic is a string used by the broker to filter messages for each LowDutyCycle channel of the connected BeanDevice, enable each channel and set its name to default to avoid problems. Then validate

Topic Ldc Ldca

Publish_status:

Channel ID:

Topic Name:

Streaming topic is a string used by the broker to filter messages for streaming data from the connected BeanDevice. Enable and set its name to default then validate

Streaming topic

Publish_status:

Streaming Topic:

This Topic will be the string we will use to connect to the BeanDevice from remote BeanScope supervision software in order to send OTACs. By default this will be set to [MAC_ID/OTAC](#) .differentiating between BeanDevice using the unique MAC ID.

Enable subscribe and set your Topic to default and validate.

Subscribe

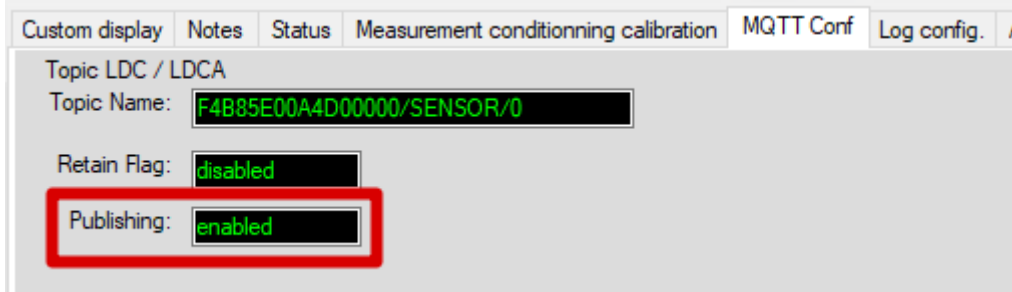
subscribe_status:

Clean session:

Topic Name:



The BeanDevice Wilow is now configured to publish its data through MQTT ,this can be checked in [MQTT conf](#) for each functional channel .

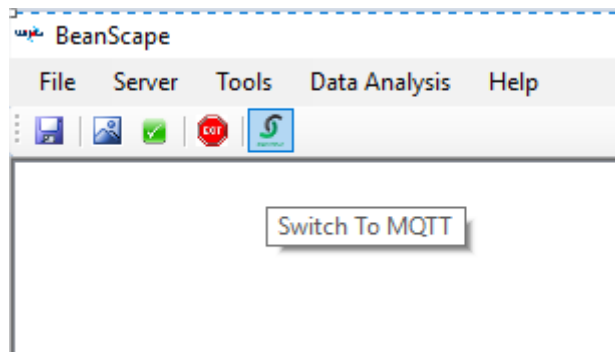


All you have to do now is to write down your Subscribe Topic name and save it as we will use it to connect to the BeanDevice willow from monitoring location.(For example: [F4B85E00A4D00000/OTAC](#))

5.3 BEANSCAPE® RA CONFIGURATION (REMOTE ACCESS)

Using **BeanScape® RA** you will have the ability to subscribe remotely to any BeanDevice® publishing data, first you have to install and run your BeanScape RA at your monitoring office.

- You have to switch to MQTT using this button



- Next ,go to Tools tab →MQTT configuration and a new configuration window will pop up ,and we will establish a communication with our IoT Gateway ,



The screenshot shows the MQTT Configuration window with the following settings:

- MQTT Configuration: Use DNS ; DNS: [redacted]; Broker IP: 197.8.139.137; Port: 1883; Enable Authentication ; User Name: [redacted]; Password: [redacted]; [Validate] button is active.
- MQTT Connection: MQTT Status: disabled; MQTT Ack: NA; [Enable MQTT] and [Start] buttons.
- Add Device: Device Mac ID: Select Device; MAC ID: [redacted]; Topic: [redacted]; [Validate] button.
- Delete BeanDevice: BeanDevice: Select device; [Delete] button.

- Port should be set to 1883
- In Broker IP you have to enter the IoT Gateway Public IP Address, **To discover your Public IP just type my IP in Google while connecting only using your Gateway data (make sure the Ethernet LAN cable is not connected) , then validate**

The screenshot shows a Google search for "my ip" with the following results:

- Search bar: my ip
- Navigation: All (selected), Images, Videos, News, More; Settings, Tools
- Results: About 811,000,000 results (0.40 seconds)
- Result: 197.8.170.135
Your public IP address

To make sure your Public access is enabled you should try to access your IoT gateway from different network using that same IP address, you should see this



197.8.170.135/cgi-bin/luci



Authorization Required

Please enter your username and password.

Username

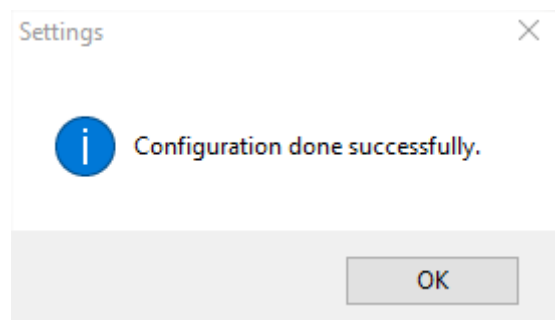
Password

Login



[Make sure to have a sim card with fixed public IP address, so if the router reboots, it doesn't change \(you have to ask your provider for that\), Still, if you don't have Fixed public IP address you can go for a dynamic DNS ,find more details on the user manual](#)

A successful configuration acknowledgement window will pop up .



- On MQTT connection, enable MQTT and click on start, and the connection is successfully established as we can see on the status .



MQTT Connection

MQTT Status **Connected**

MQTT Ack **Client Accepted**

- Now, enter the BeanDevice Wilow MAC_ID and Subscribe Topic we had previously setup for the BeanDevice .validate and the BeanDevice profile will be there .

Add Device

Device Mac ID

MAC ID

Topic

Request sent Successfully

Close the MQTT configuration window and make sure the server is started; the BeanDevice will be at your disposal, to read measurement,

Mqtt Status : Connected





Please refer to the BeanDevice® Wilow® user manual section for more information about MQTT, "click here"



For detailed information on the MQTT exchanged frames ,please refer to our technical note on the MQTT communication protocol ,"click here"



Several information on using MQTT in IoT connected world with examples can be found in our technical note : BeanDevice® Wilow® IoT starter Guidelines using MQTT protocol, "click here"



6. TECHNICAL NOTES AND VIDEOS

In addition to this quickstart paper, please consult the user guide of the BeanDevice® Wilow and all related technical notes and videos

Document name (Click on the web link)	Related product	Description
Wilow WiFi sensor user manual	Wilow® products line	BEANDEVICE® WILOW® user manual
Wilow Battery life in Streaming mode	Wilow® products line	Wilow wireless sensors battery life in streaming mode
Wilow Data acquisition modes	Wilow® products line	Data acquisition modes available on the BeanDevice® Wilow
TN RF 004- «MQTT Communication Protocol »	Wilow® products line	MQTT Communication Protocol for a seamless integration into a third-party IOT software
TN RF 005 «Building a reliable Wi-Fi network with Wilow sensors»	Wilow® products line	The aim of this document is to describe the autonomy performance of the BeanDevice® SmartSensor® and ProcessSensor® product line in streaming and streaming packet mode.

Beanair video link (YouTube)	Related products
Getting started with BeanDevice® Wilow - Wi-Fi Low Power Sensors	BeanDevice® Wilow
Wilow - Wi-Fi Sensors-Low duty cycle data acquisition mode on BeanDevice® Wilow	BeanDevice® Wilow
Wilow - Wi-Fi Sensors-Streaming mode with continuous monitoring on BeanDevice® Wilow	BeanDevice® Wilow
Wilow - Wi-Fi Sensors-How to setup Wilow Datalogger	BeanDevice® Wilow
Wilow - Wi-Fi Sensors-Smart Shock Detection (SSD) mode	BeanDevice® Wilow®





Ready for Industrial Internet of Things ?

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BeanDevice® WiLow® Quickstart



[All the videos are available on our YouTube channel](#)



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