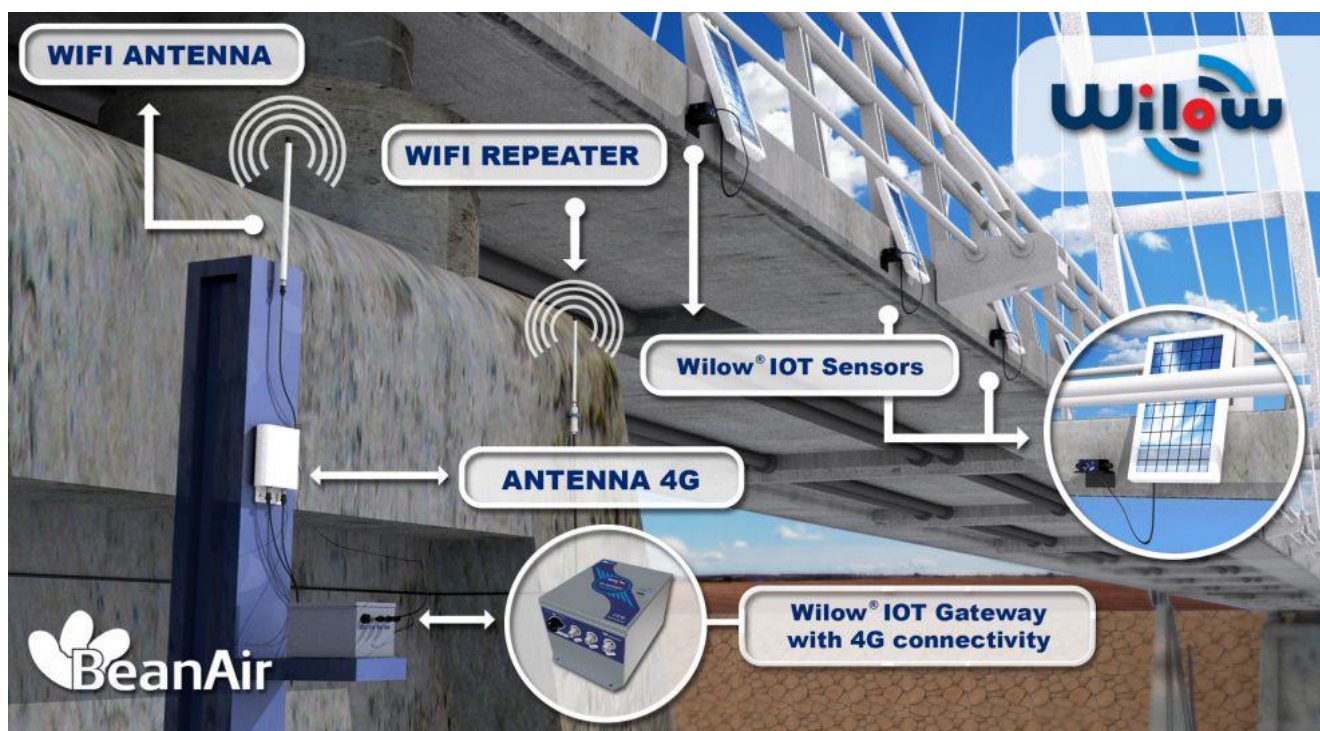


Version 1.7

**WILOW®
USER
MANUAL**

WILOW® (WIFI LOW POWER) IOT GATEWAY USER GUIDE



BeanAir
Rethinking Sensing Technology



DOCUMENT

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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. Keep us informed of your comments and suggestions for improvements.

Beanair appreciates feedback from the users of our information.




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

<i>AES</i>	Advanced Encryption Standard
<i>CCA</i>	Clear Channel Assessment
<i>CSMA/CA</i>	Carrier Sense Multiple Access/Collision Avoidance
<i>GTS</i>	Guaranteed Time-Slot
<i>Ksps</i>	Kilo samples per second
<i>LLC</i>	Logical Link Control
<i>LQI</i>	Link quality indicator
<i>LDCDA</i>	Low duty cycle data acquisition
<i>MAC</i>	Media Access Control
<i>PAN</i>	Personal Area Network
<i>PER</i>	Packet error rate
<i>RF</i>	Radio Frequency
<i>SD</i>	Secure Digital
<i>WSN</i>	Wireless sensor Network

4. 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>

5. ACRONYMS AND ABBREVIATIONS

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

6. DOCUMENT ORGANISATION

WiLow IoT Gateway product
description

- Details the IoT Gateway® product

IoT Gateway® installation
guidelines

- Details the installation guidelines of the IoT Gateway®

IoT Gateway® supervision from
the Beanscape®

- Details IoT Gateway® supervision from the BeanScape®

7. WILLOW® IOT GATEWAY PRODUCT PRESENTATION



- ✓ *It is highly recommended to read all the user manual related to Beanair software & equipment (BeanScape® Wilow® and BeanDevice® WiLow®) before getting start your IoT Gateway®.*
- ✓ *Use only accessories supplied by Beanair (batteries, power supply unit, and antenna). Use of other materials may damage the IoT Gateway®;*
- ✓ *Only Beanair is qualified to make changes on the IoT Gateway®;*
- ✓ *Don't try to remove the adhesive label on the product; it contains important information such as the MAC address or sensor measurement range*

7.1 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® Wilow® RA) will be supported with 3G/4G channel.

In order to assure a continuous monitoring without interruption caused by network provider, it is recommended to use mobile broadband package or M2M sim card rather than using unlimited data plans which are available for smartphones (this is because providers monitor usage of unlimited plans and if they are being used in devices other than smartphone they will restrict access)

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

Wilow® IoT Gateway is hosting an embedded MQTT Broker, and enables a remote access to the BeanScape® Wilow® RA.

Wilow IOT Gateway is available in three versions:

- **WILOW-IOT-GATEWAY-4G-MPWR**, Mains Power supply
- **WILOW-IOT-GATEWAY-4G-WDS-MPWPR**, Mains power supply, WDS function
- **WILOW-IOT-GATEWAY-4G-SOLAR**, Solar Power Supply WILOW-IOT-GATEWAY-4G-SOLAR, with Solar Power Supply

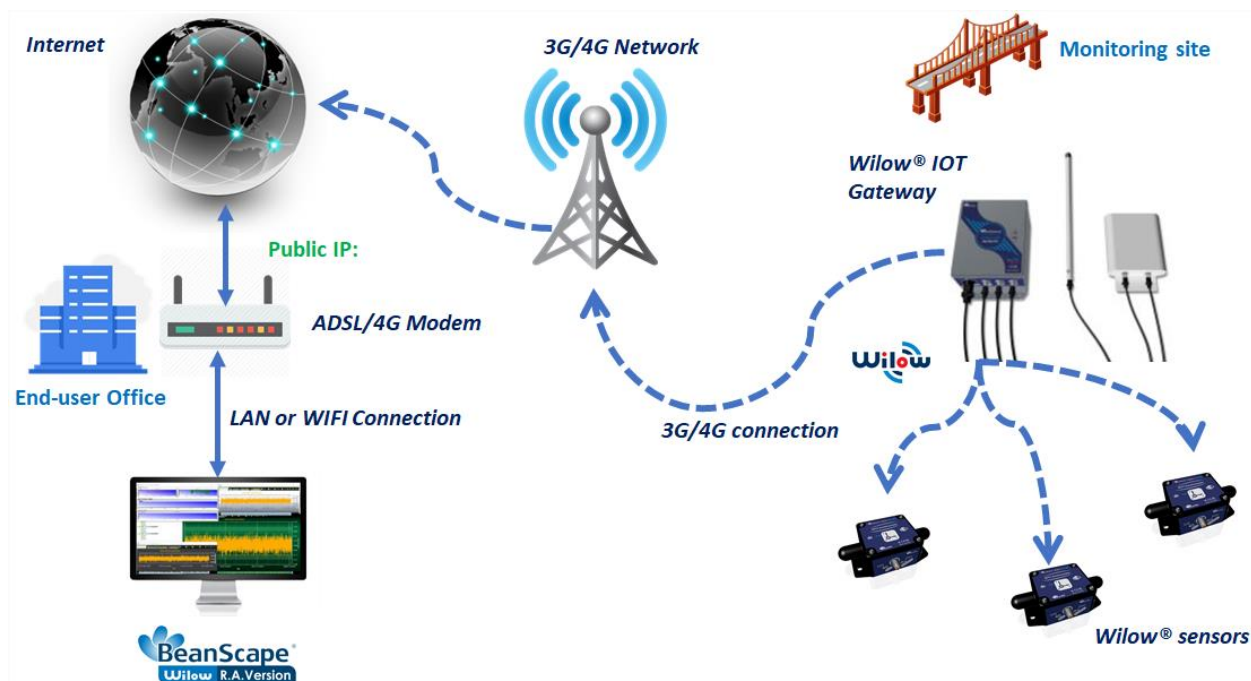


Figure 1: Remote access to Monitoring site

7.2 OUTBOXING YOUR WILLOW® IOT GATEWAY



Figure 2: Outboxing your Wilow IOT Gateway

7.3 ACCESSORIES DESCRIPTION

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

	Included accessories
4G Antenna	1 x 4G Antenna 12dBi - with pole mounting Ref: WL-4G-HG-ANT-12DBI
WIFI Antenna	1 x High Gain Wifi Antenna 9dBi - with pole mounting kit Ref: HG-OMNI-OUT-7DBI
External cable for WIFI Antenna	1 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
External cable for LTE Antenna	2 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
Waterproof Plug for AC Power Input	1 x Circular Connector Hirschmann CA 3LS, Waterproof IP67 Ref: WL-CA3LS-PLUG

Make sure to use the right connectors to connect your antennas and power supply :



Figure 3 : Antenna connectors

7.4 WIRELESS DISTRIBUTION SYSTEM FUNCTION DESCRIPTION

Wireless Distribution system is only available on the reference product: **ILOW-IOT-GATEWAY-4G-WDS-MPWPR**

Beanair is using Ubiquiti Bullet M2 HP Access point with WDS function. While there are some other manufacturers who use WDS that is compatible with Ubiquiti radios, WDS can vary depending on the manufacturer.

WDS is a way to enable layer-2 transparency across radio links. Because it preserves the MAC address from the traffic source, enabling WDS on bridged links is always recommended. WDS is not designed to interoperate between radio vendors, so by using two Ubiquiti radios, users can pass virtually all traffic across wireless links.

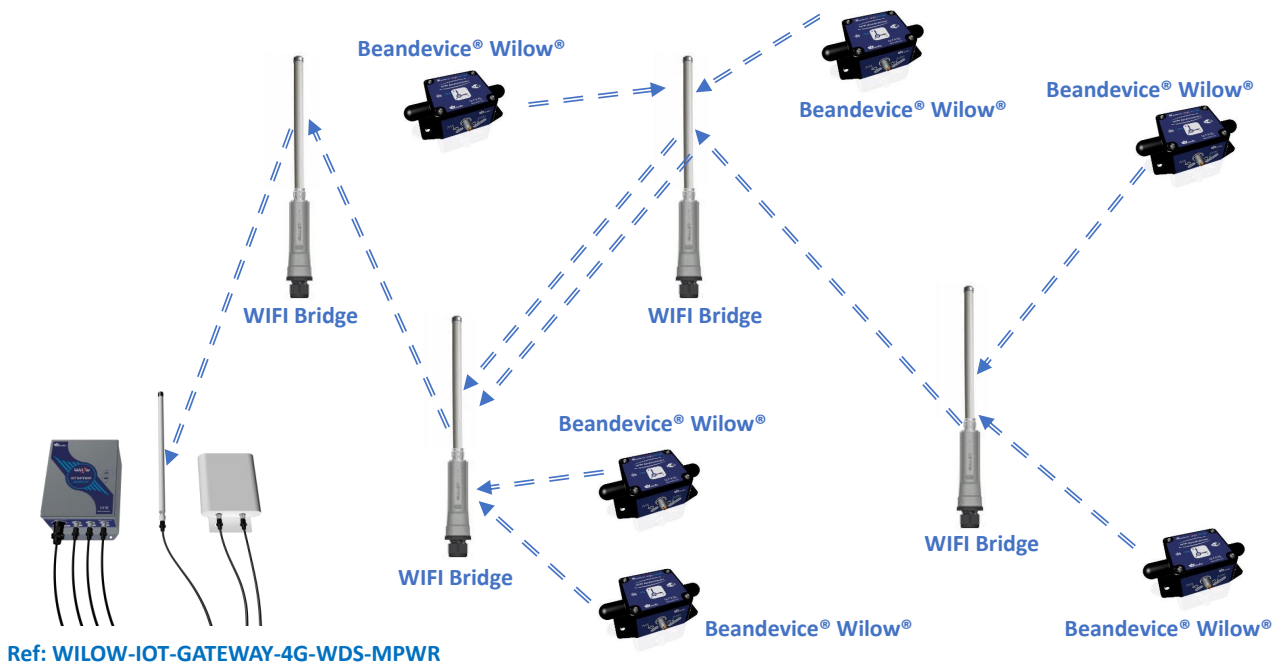


Figure 4: WIFI cluster-tree network architecture with WDS function

Without WDS function, users can setup a star wifi network without wifi cluster-tree network architecture:

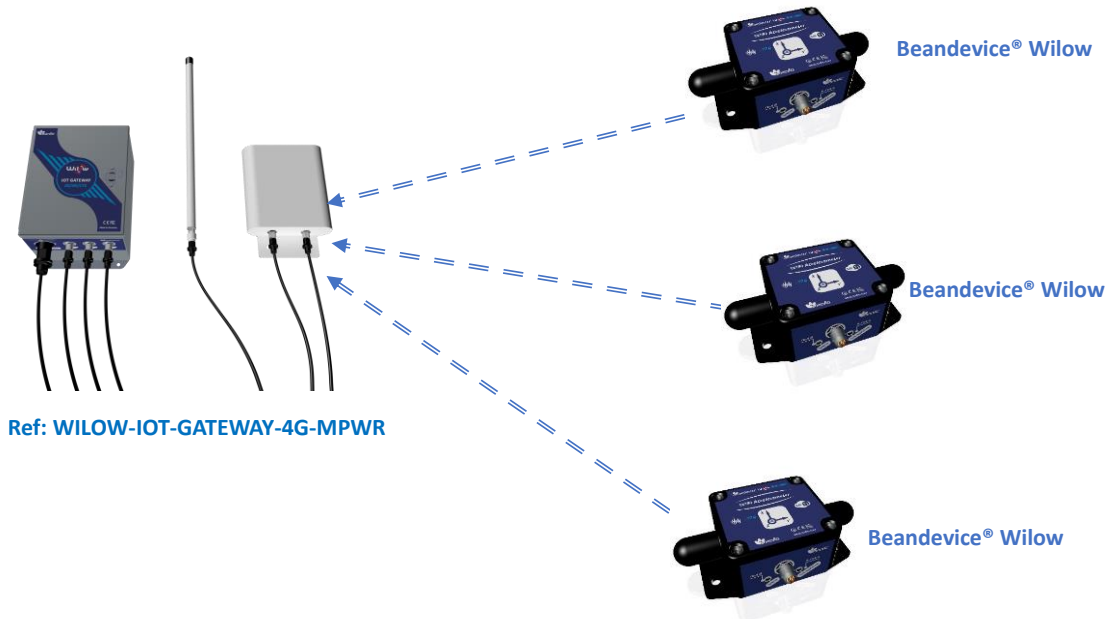


Figure 5: Wifi star network architecture (without WDS function)

7.5 TECHNICAL SPECIFICATIONS

7.5.1 Product reference

Product reference
WILOW-WIFI-IOT-GATEWAY-4G- OPT1-PWR
OPT1: Option for WDS function - wireless distribution system (not available if you choose Solar Power Supply)
PWR – External Power supply
*MPWR: Mains power supply with UPS Battery (Input: 90 to 264VAC) *SOLAR - Solar Power supply
Example 1: WILOW-IOT-GATEWAY-4G-UP12, with UPS Battery 12Ah Example 2: WILOW-IOT-GATEWAY-4G-WDS-UPS12, with WDS option and UPS Battery Example 3: WILOW-IOT-GATEWAY-4G-SOLAR, with Solar Power Supply

7.5.2 WIFI Connectivity

	WIFI Connectivity specifications
Wireless Protocol	IEEE 802.11 b/g
WIFI configuration	Wireless AP, If WDS option is selected : Station and Bridge with WDS (Wireless Distribution System)
Operating frequency	2412-2462 MHz
Sensitivity	-74dBm to -90 dBm
DataRate	6 to 24 Mbps
Output power	If WDS option is selected : 28 dBm If WDS option is not selected : 20dBm
High Gain Ominidirectionnal WIFI Antenna	Frequency range 2400-2500MHz Gain : 9dBi, VSWR < 1.2 Impedance 50 Ohm, Polarization Vertical Beamwidth: Vertical plane 15°, Horizontal plane 360° Dimensions : 540x23 mm, Weight : 0.61 kg Connector : N female, Wind load : (170km/h) 11 N

7.5.3 3G/4G/LTE Router

	3G/4G Connectivity specifications
LTE	<ul style="list-style-type: none"> ■ LTE FDD: B1/B3/B5/B7/B8/B20 ■ LTE TDD: B38/B40/B41 ■ LTE CAT4 up to 70 Mbps DL ■ LTE CAT4 up to 50 Mbps UL ■ Class 3 (23dBm±2dB) for LTE FDD ■ Class 3 (23dBm±2dB) for LTE TDD
UMTS/DC-HSPA+	<ul style="list-style-type: none"> ■ 850/900/2100 MHz ■ DC-HSPA+ mode: Max 42Mbps (DL) Max 5.76Mbps (UL) ■ UMTS mode: 384 kbps DL, 384 kbps UL ■ TD-SCDMA: Max 4.2Mbps (DL) Max 2.2Mbps (UL) ■ Power Class 3 (24dBm +1/-3dB) for UMTS bands ■ Class 3 (24dBm+1/-3dB) for TD-SCDMA

GSM/GPRS/EDGE	<ul style="list-style-type: none"> ■ 900/1800 MHz ■ GPRS/EDGE Multi-slot Class 12 ■ Power Class E2 (27dBm ±3dB) for GSM 900 ■ Power Class E2 (26dBm +3/-4dB) for DCS 1800 ■ Power Class 4 (33dBm ±2dB) for GSM 900 ■ Power Class 1 (30dBm ±2dB) for DCS 1800
Omnidirectional 4G Antenna	<p>Omnidirectional 4G Antenna (2x2 MIMO) Weather-resistant and UV-resistant plastic / PVC enclosure VSWR < 1.8 Impedance: 50 Ohm Beam width: 360° Horizontal - 20° Vertical Gain : 8dBi @ 800 MHz 12dBi @ 1800MHz 12dBi @ 2600MHz Frequency: 791-862 MHz (2G, 4G) 1700 - 2100 MHz (3G, 4G) 2500 - 2700 (4G) Connectors: 2 x N female Mounting Kit: U-clamp for 30-50mm diameter handles</p>

7.5.4 Environmental and Mechanical

	Environmental and Mechanical
Casing	Steel enclosure with padlock adapter, Light gray color
Dimensions	25.4 cm x 20.3 cm x 15.24 cm
IP NEMA Rating	IP66 Nema 6
Weight	9.3 kg
Mounting Process	Screw mounting
Operating Temperature	Battery Charging: -15°C to 50°C Battery Discharging: -20°C to 60°C
Norms & Radio Certifications	<ul style="list-style-type: none"> . CE Labelling Directive R&TTE (Radio) ETSI EN 300 328 (Europe) . FCC Part 15.247 (North America) . IC RS210 . ROHS - Directive 2002/95/EC

7.5.1 2.4GHz High Gain Antenna

9dBi 2.4GHz antenna specifications



Electrical Parameters

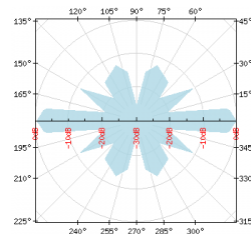
Frequency range	2400-2500MHz
Gain	9dBi
VSWR	< 1.2
Impedance	50 Ohm
Polarization	Vertical
Vertical plane	15°
Horizontal plane	360°
Protection	shorted for DC

Mechanical Parameters

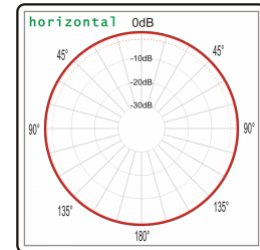
Dimensions	540x23 mm
Weight	0.61 kg
Connector	N female
Wind load (170km/h)	11 N

Patterns

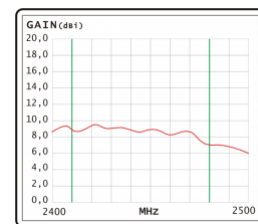
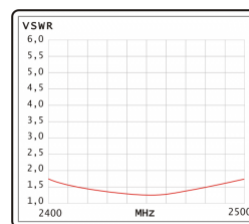
Vertical



Horizontal



VSWR and GAIN



BeanAir GmbH
Wollener Straße 32 - 34
12681 Berlin - Germany
Email: info@beanair.com
www.beanair.com

Ref: HG-OMNI-OUT-9DBI

Antenna reference: HG-OMNI-OUT-9DBI

7.5.2 Dual LTE Antenna



Figure 6: Dual LTE Antenna with u-clamp mounting kit

The enclosure of this multiband 4G antennas is manufactured from robust, weather-resistant and UV-resistant plastic / PVC. This allows using this 4G antenna for in- and outdoor appliances even under extreme weather conditions.

The antenna is designed for mast/pole or wall handle installation. A mounting kit (u-clamp for 30-50mm diameter handles) is included.

Omnidirectionnal 4G Antenna

Omnidirectional 4G Antenna (2x2 MIMO)
Weather-resistant and UV-resistant plastic / PVC enclosure
VSWR < 1.8
Impedance: 50 Ohm
Beamwidth: 360° Horizontal - 20° Vertical
Gain :
8dBi @ 800 MHz
12dBi @ 1800MHz
12dBi @ 2600MHz
Frequency:
791-862 MHz (2G, 4G)
1700 - 2100 MHz (3G, 4G)
2500 - 2700 (4G)
Connectors: 2 x N female
Mounting Kit: U-clamp for 30-50mm diameter handles

7.5.3 AC/DC power adapter with battery charger (UPS function)

7.5.3.1 Specifications

	AC power supply with UPS battery (-MPWR option is selected)
Battery	Valve Regulated Lead-Acid (VRLA) Capacity 12Ah
Battery protection	Overvoltage/Overload/Short circuit/Battery low/Battery reverse polarity
AC Voltage Range (Input)	90 to 264VAC
AC Range (Input)	0.75A/115VAC 0.5A/230VAC
Frequency Range	47 ~ 63Hz
Inrush current	Cold Start 20A/115VAC, 40A/230VAC
Safety and EMC	Safety standards: UL60950-1, TUV EN60950-1 approved Withstand Voltage: I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC Isolation Resistance TANCE: I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C/ 70% RH EMC emission: Compliance to EN55032 (CISPR32) Class B, EN61000-3-2,-3 EMC immunity: Compliance to EN61000-4-2,3,4,5,6,8,11, EN55024, light industry level, criteria A
Socket for AC power supply	Industrial and Waterproof Socket Circular Socket CA 3 GD - Hirschmann Rated Voltage: 400VA Rated Current:16A

7.5.3.2 Mains power supply (Hardware version before 15.05.2019)

The previous hardware version comes with a Female Socket and a Male Plug.:

Wiring Code – Socket Side

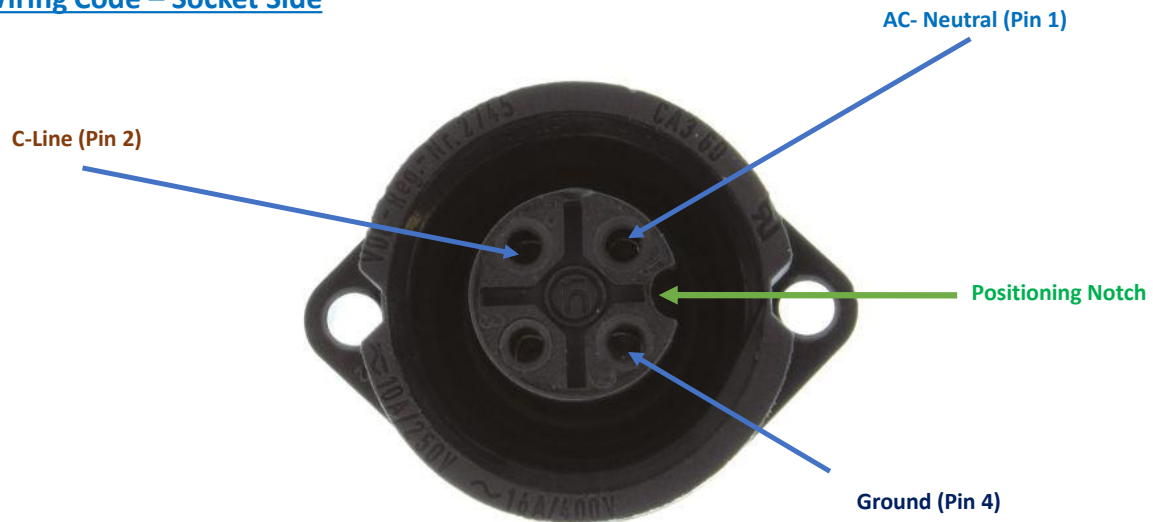


Figure 7 : Mains power supply – wiring code



Figure 8: Waterproof Plug

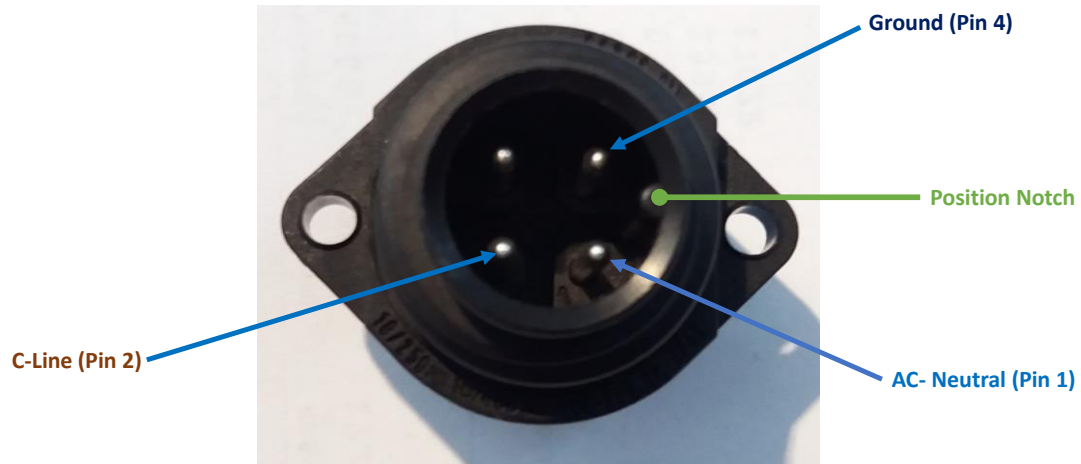
Plug Ref: 934124100, provider: Hirschmann

7.5.3.3 Mains power supply (Hardware version after 15.05.2019)

The new hardware version comes with a Male Socket and a Female Plug:

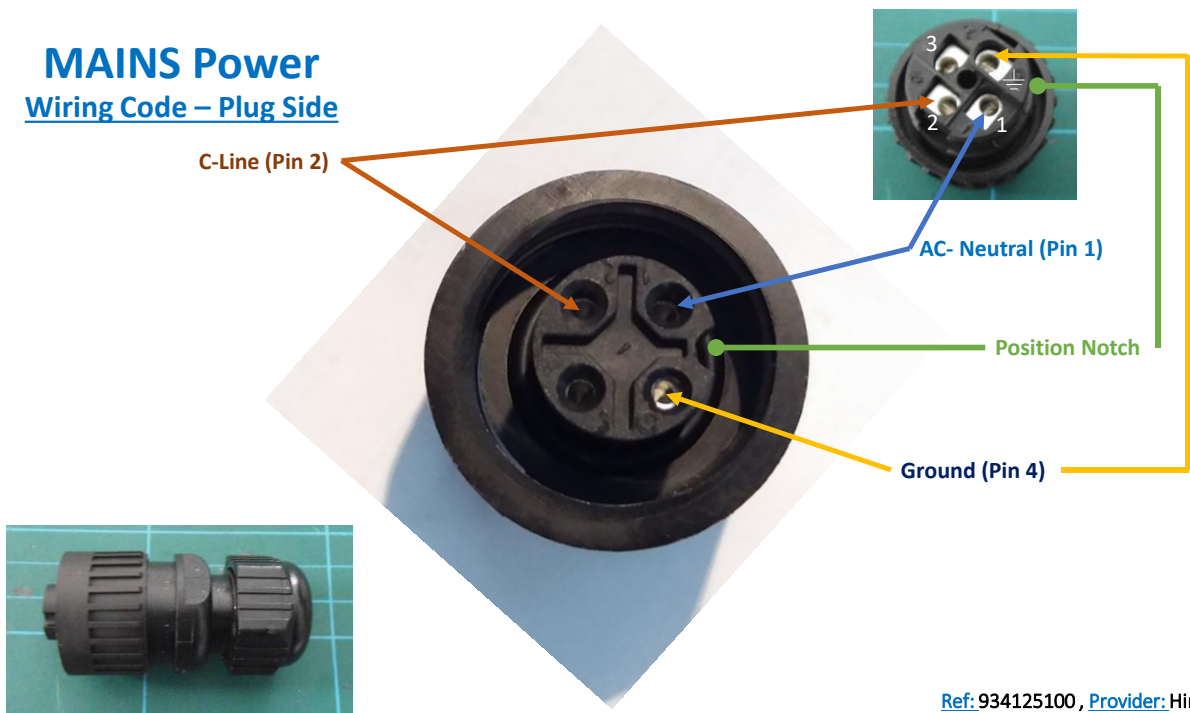
MAINS Power

Wiring Code – Socket Side



MAINS Power

Wiring Code – Plug Side



Ref: 934125100, Provider: Hirschmann

7.5.4 Solar power supply with UPS battery

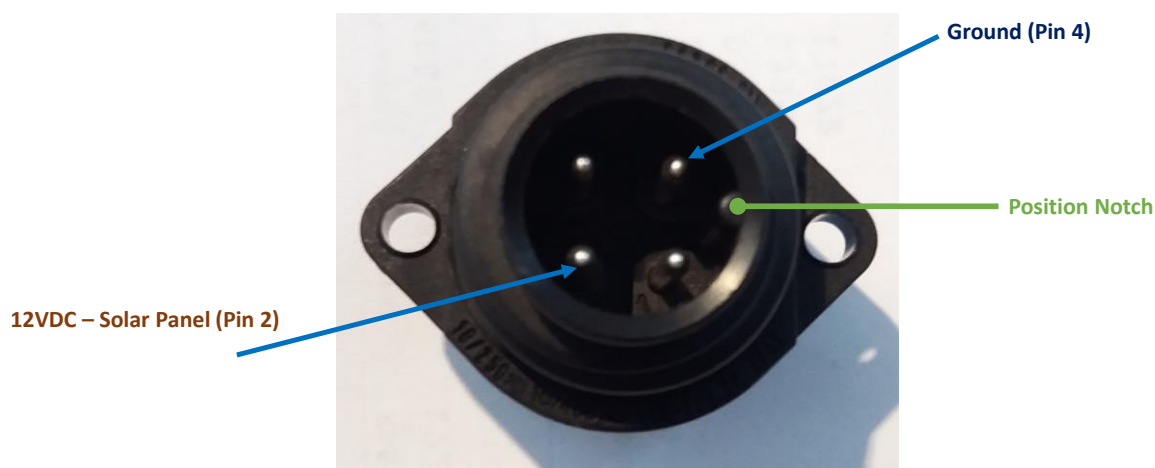
7.5.4.1 Specifications

	Solar Panel power supply with UPS Battery (-SOLAR option is selected)
Battery	Valve Regulated Lead-Acid (VRLA) Capacity 12Ah
Solar panel technology	Polycrystalline 100W, anodized aluminum frame. Surface protection with ESG solarglass. Dimensions (LxWxH): 1005 x 670 x 35mm
Solar charging controller	Maximum Input current: 10A Power consumption < 2.5mA , Led switch on Nominal voltage :12VDC Led displays: battery full and charging
Socket for Solar Panel Connection	Industrial and Waterproof Socket Circular Socket CA 3 GD - Hirschmann Rated Voltage: 400VA Rated Current: 16A

7.5.4.2 Wiring code (Hardware version after 15.06.2019)

SOLAR Power

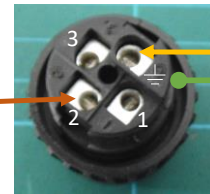
Wiring Code – Socket Side



SOLAR Power

Wiring Code – Plug Side

12VDC – Solar Panel (Pin 2)



Position Notch

Ground (Pin 4)



Ref: 934125100, Provider: Hirschmann

DC Power:

The solar power controller can work between **13VDC to 20VDC**, user can use an **AC/DC power adapter** in this voltage rating.



If the DC Voltage is less than 13VDC, the provided voltage will not be enough to power the Solar Power Manager

7.5.5 Included accessories

	Included accessories
4G Antenna	1 x 4G Antenna 12dBi - with pole mounting Ref: HG-4G-OMNI-ANT-12DBI
WIFI Antenna	1 x High Gain Wi-Fi Antenna 9dBi - with pole mounting kit Ref: HG-OMNI-OUT-7DBI
External cable for WIFI Antenna	1 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
External cable for LTE Antenna	2 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
Waterproof Plug for AC Power Input	1 x Circular Connector Hirschmann CA 3LS, Waterproof IP67 Ref: PWR-CA3LS-PLUG

8. INSTALLATION GUIDELINE

8.1 HOW TO MOUNT THE WILLOW® IOT GATEWAY

Your Wilow® IOT Gateway should be mounted on the vertical position with the antenna socket pointing to the ground.

Use a padlock to protect your Wilow® IOT Gateway casing against vandalism.



Use a Padlock to secure your
Wilow® IOT Gateway

9. HOW TO SETUP A REMOTE ACCESS

9.1 MQTT ARCHITECTURE

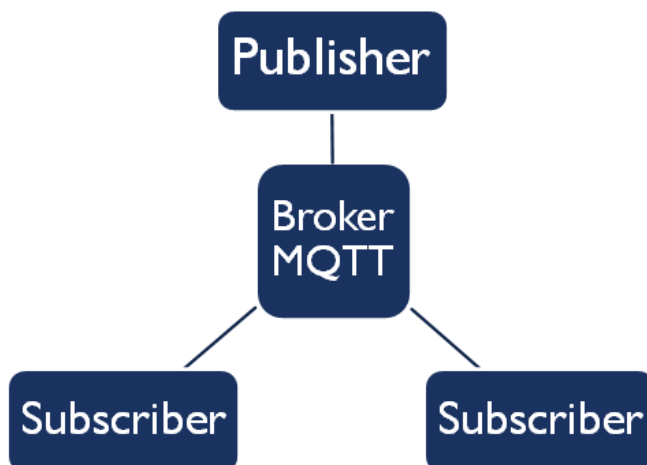


Figure 9 :MQTT architecture

MQTT is based on publish & subscribe architecture. The **BeanDevice® Wilow®** will publish all the data through MQTT broker hosted on the Wilow® IOT Gateway. Thanks to the **BeanScape® RA** user can subscribe to any publishing BeanDevice® Wilow® to receive and collect real time data measurement from the devices also to configure the BeanDevice® Wilow®



Figure 10: Wilow® IOT Gateway enclosure

After opening the Wilow® IoT Gateway metallic enclosure, gently untighten the 3G/4G antenna connectors (displayed below) and use a screwdriver to open the router lid to insert your sim card.

9.2 WHICH SIM CARD TO USE?

If you need to setup a remote access to the Wilow® IOT Gateway then please bear in mind that the 4G Data SIM cards available directly from EE, Vodafone, O2 and 3Mobile (including the MVNO partners of these primary networks eg. Tesco, Virgin, Network ID, BT etc.) Will only provide you connection with a PRIVATE IP Address so you will not be able to remotely connect to the router. This also means that you will not be able to use DYNDNS because the service provider has only given the 4G connection a PRIVATE IP address on their network.

For remote access and monitoring applications where you need to connect to the router and to your devices on the LAN we recommend a 4G Data SIM Card with fixed PUBLIC IP. A Fixed IP SIM card is a data SIM with fixed or static IP address. This provides a secure and reliable 2-way connection between you and your device from any location

- For UK customers: [Click on the following weblink](#)
- For German customers: [Click on the following weblink](#)
- Europe and North America: [Click on the following weblink](#)

9.3 HARDWARE DESCRIPTION AND SYSTEM CONFIGURATION

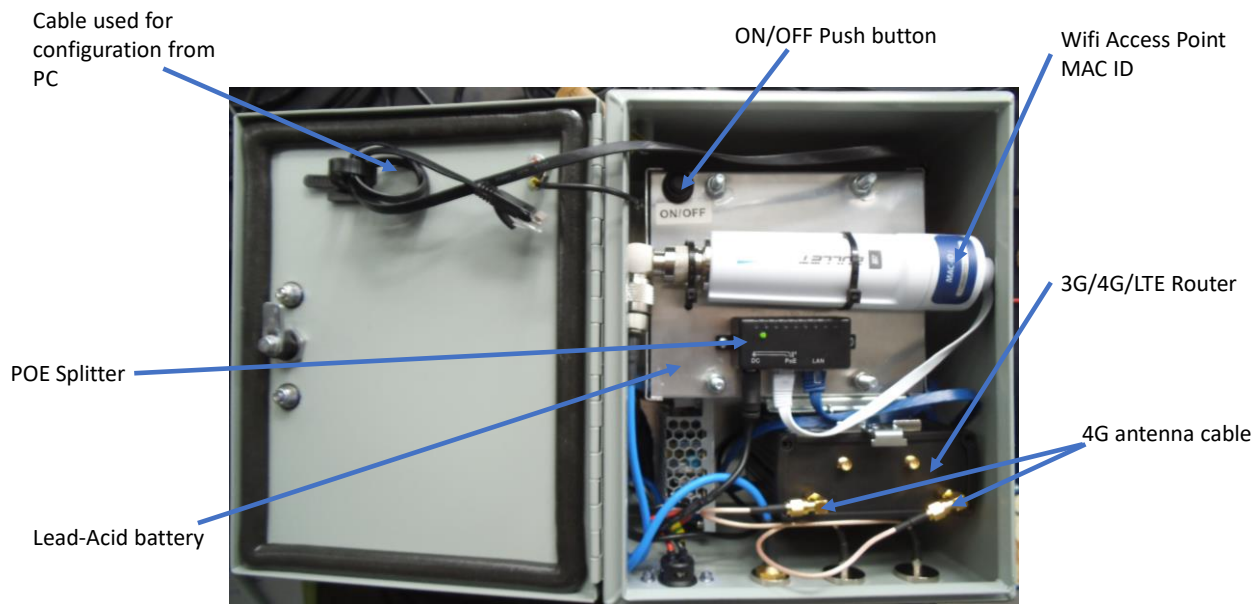


Figure 11 :Wilow® IoT Gateway (Ref: WILOW-IOT-GATEWAY-4G-WDS-MPWR)

9.4 SYSTEM CONFIGURATION

Use the Ethernet cable inside the enclosure to connect to your PC running **BeanScape® Wilow® RA**, at the same time connecting your **BeanDevice® Wilow®** with the same PC using the provided USB cable.

Both LTE Router and WIFI Access point are tested and configured at our factory, therefore you don't need to spend time to configure all the different Network settings for a remote access.

However, if you decide to restore the factory settings, [Appendix 1](#) and [Appendix 2](#) describe how to re-configure these two devices.

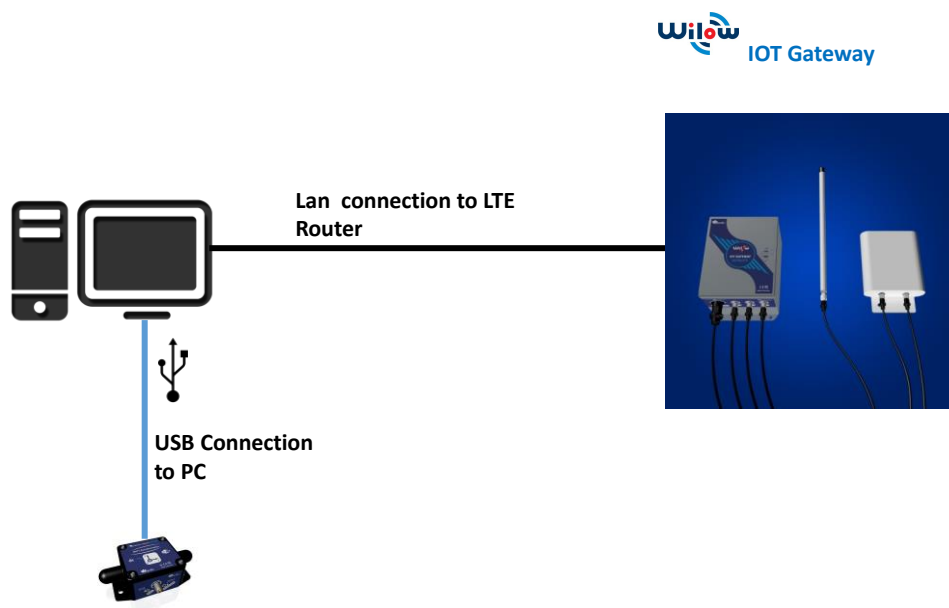


Figure 12 :Network configuration

9.5 LTE ROUTER CONFIGURATION

9.5.1 Pre-configured settings

IP address	192.168.1.243
Login (lower case)	admin
Password (lower case)	Beanair2020!
WIFI Access point	Disabled , if you are using Wifi AP with WDS Function Enabled , if you are using internal Wifi AP (no WDS function)
MQTT broker	Enabled
MQTT broker port	1883
Remote access	Enabled

9.5.2 SIM Card insertion

Insert the SIM card provided by your ISP (Internet Service provider). The Correct SIM card orientation is shown on the following picture:

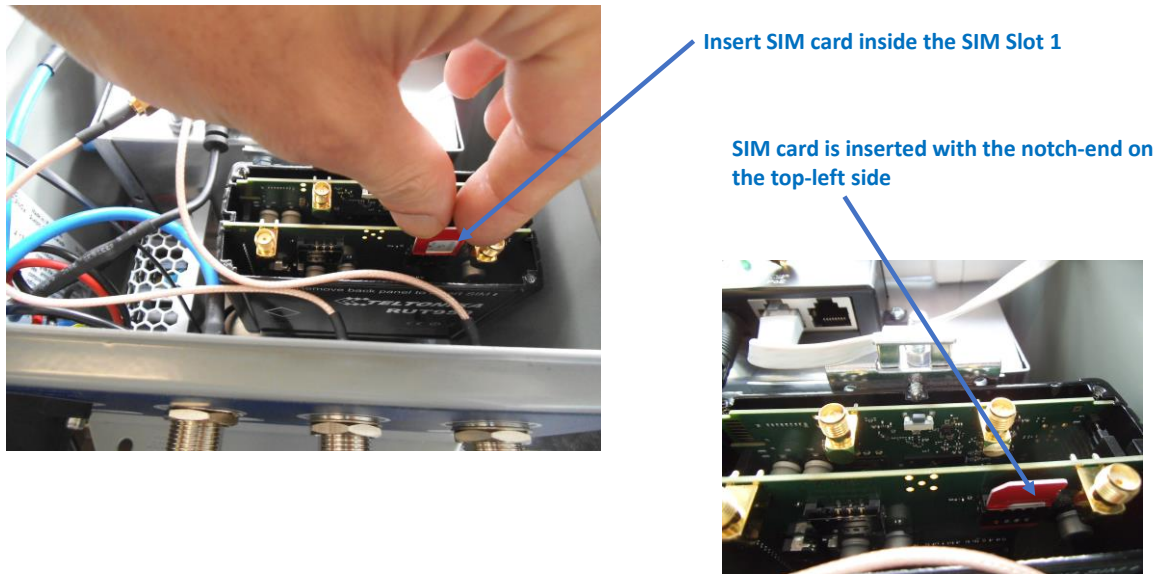


Figure 13 :Inserting sim card

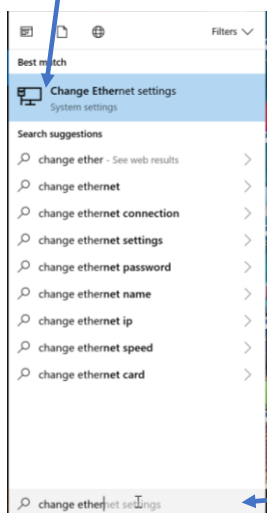
9.5.3 Logging to your router

Wilow® IOT Gateway comes with a private embedded MQTT broker enabling all the BeanDevice® on the LAN to use to stream and publish all the measurements to the internet .in order to use that we have to make sure it is well configured as follows:

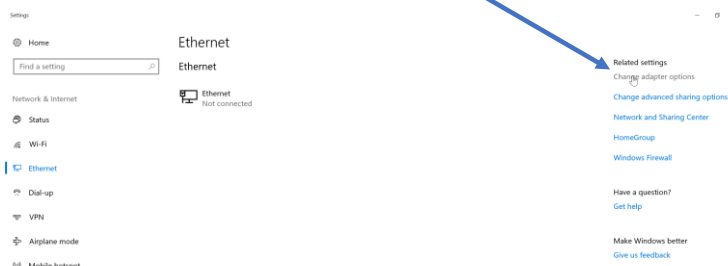
Use browser (Chrome, safari, or Firefox. Avoid internet explorer) to get access to the Gateway interface.

- use this default IP Address: 192.168.1.243
- **Username:** admin
- **Password:** Beanair2020!

2. Select Ethernet Settings

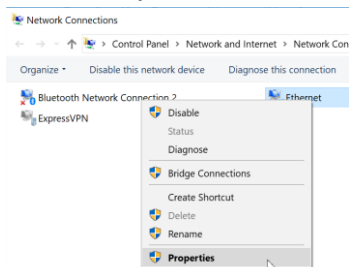


3. A new window pop-up's , select Change adapter options

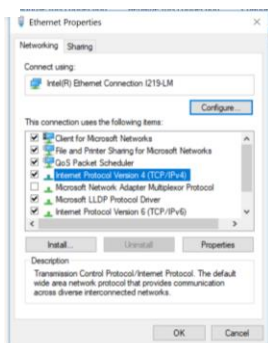


1. Use the search tool, type in Change Ethernet Settings

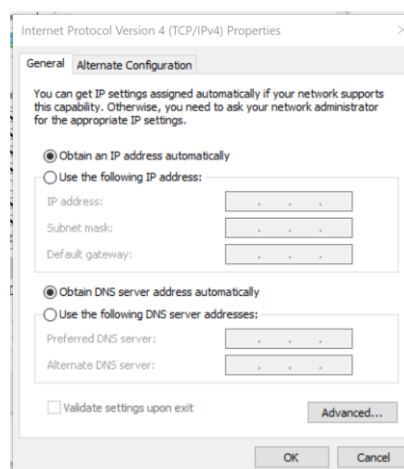
4. right click on your Ethernet device which is connected to your 4G Router

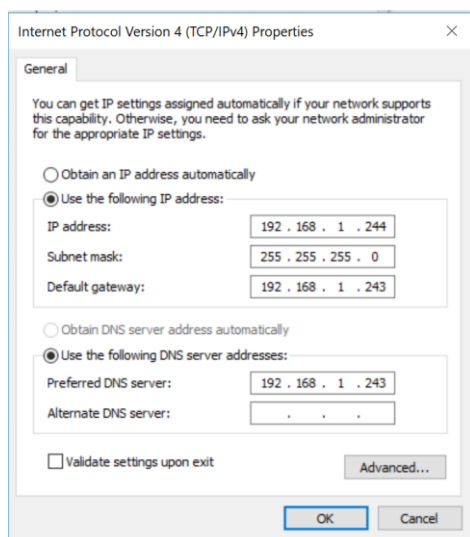


5. Click on Properties, then select Internet Protocol Version 4 (TCP/IPv4) then click on Properties



6. By default DHCP is enabled on your PC, i.e. IP address can be automatically allocated

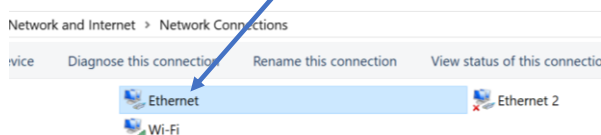




7. Choose Manual IP configuration

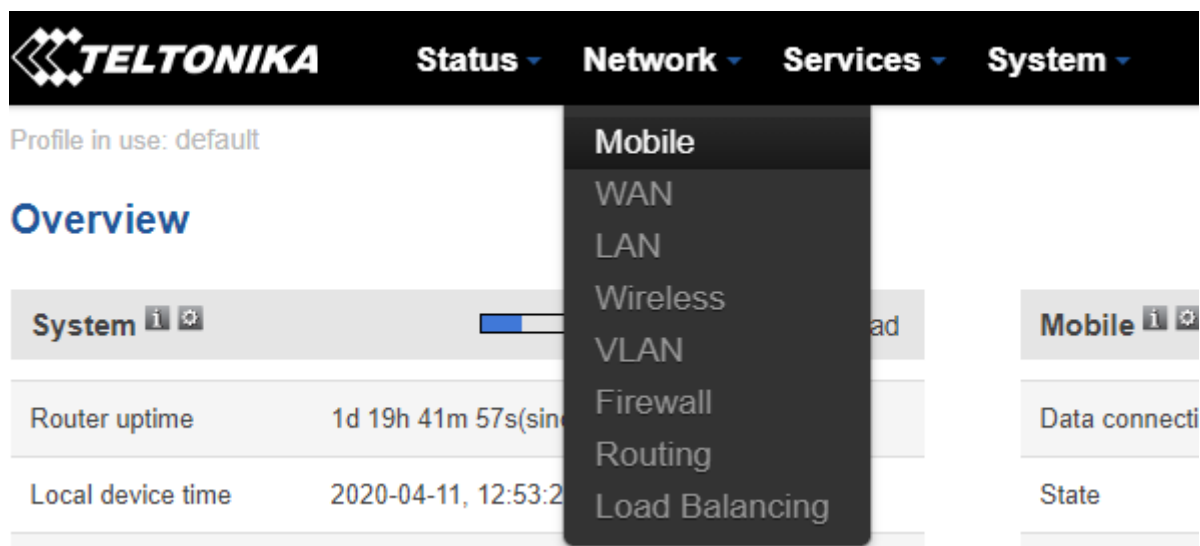
- First select an IP address. The 4G router is configured with the IP Address **192.168.1.243**. You can enter an IP in the form of 192.168.1.XXX, where XXX is a number in the range of **2-254**.
- Avoid to use the same IP address than your 4G Router which is **192.168.1.243**
- Enter 255.255.255.0 for 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



9.5.4 SIM card configuration

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



General Network Operators Mobile Data Limit

Mobile Configuration

Mobile Configuration

SIM 1

Connection type QMI

Mode NAT

Passthrough and Bridge modes are disabled when multiwan is enabled

Auto APN ☒

Connection will be established automatically

PIN number 0000

PUK code

Dialing number *99#

MTU 1500

Service mode Automatic

Deny data roaming ☐

Choose QMI connection type because PPP is slower than QMI.

QMI option is highly recommended.

Check Auto APN and the connection will be established automatically.

Access Point Name (APN): is a configurable network identifier used by a mobile device when connecting to a GSM carrier

Enter the right PIN number and PUK code of your SIM card

Used this field only if the SIM card's PIN number was used

Choose 1500

Choose Automatic as a service mode

Uncheck Deny data roaming option

Mobile Data On Demand

Enable ☒

No data timeout (sec) 10

Force LTE network

Enable ☒Reregister ☐

Interval (sec) 300

Save



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.

9.5.5 Checking your Mobile Status

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



Figure 14 : Mobile status

9.5.6 WIFI access point with WDS function, pre-configured settings (Ref: WILOW-IOT-GATEWAY-4G-WDS-MPWR)

Wilow® IOT Gateway (Ref: WILOW-IOT-GATEWAY-4G-WDS-MPWR) integrates a powerful WIFI Access point with WDS function from Ubiquiti (Bullet M2 HP). This access point is already configured with the following settings:

AP IP address	192.168.1.20
AP Webserver Login	ubnt
AP Webserver PW	Beanair2019
WIFI SSID	Beanair
WIFI Password	Beanair2019
Encryption	WPA2-AES
WIFI RF Channel	2437
AirMax function	disabled



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

9.5.1 WiFi access point pre-configured settings (Ref: WILOW-IOT-GATEWAY-4G -MPWR and (Ref: WILOW-IOT-GATEWAY-4G-SOLAR)

The LTE Router (RUT950) integrates a WIFI Access Point. This access point is already configured with the following settings:

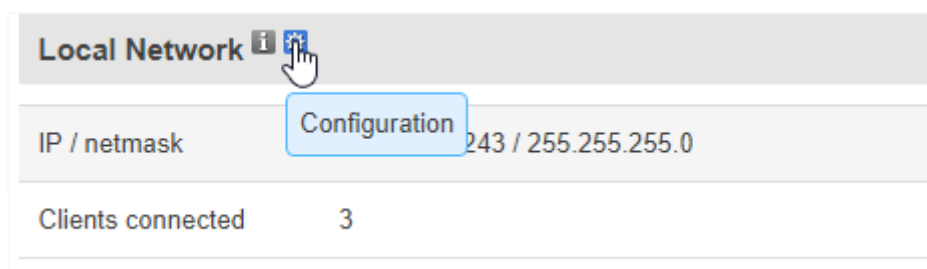
WIFI SSID	Beanair
WIFI Password	Beanair2019
Encryption	WPA2-PSK, Cipher: Auto
WIFI RF Channel	2437 (Channel 6)

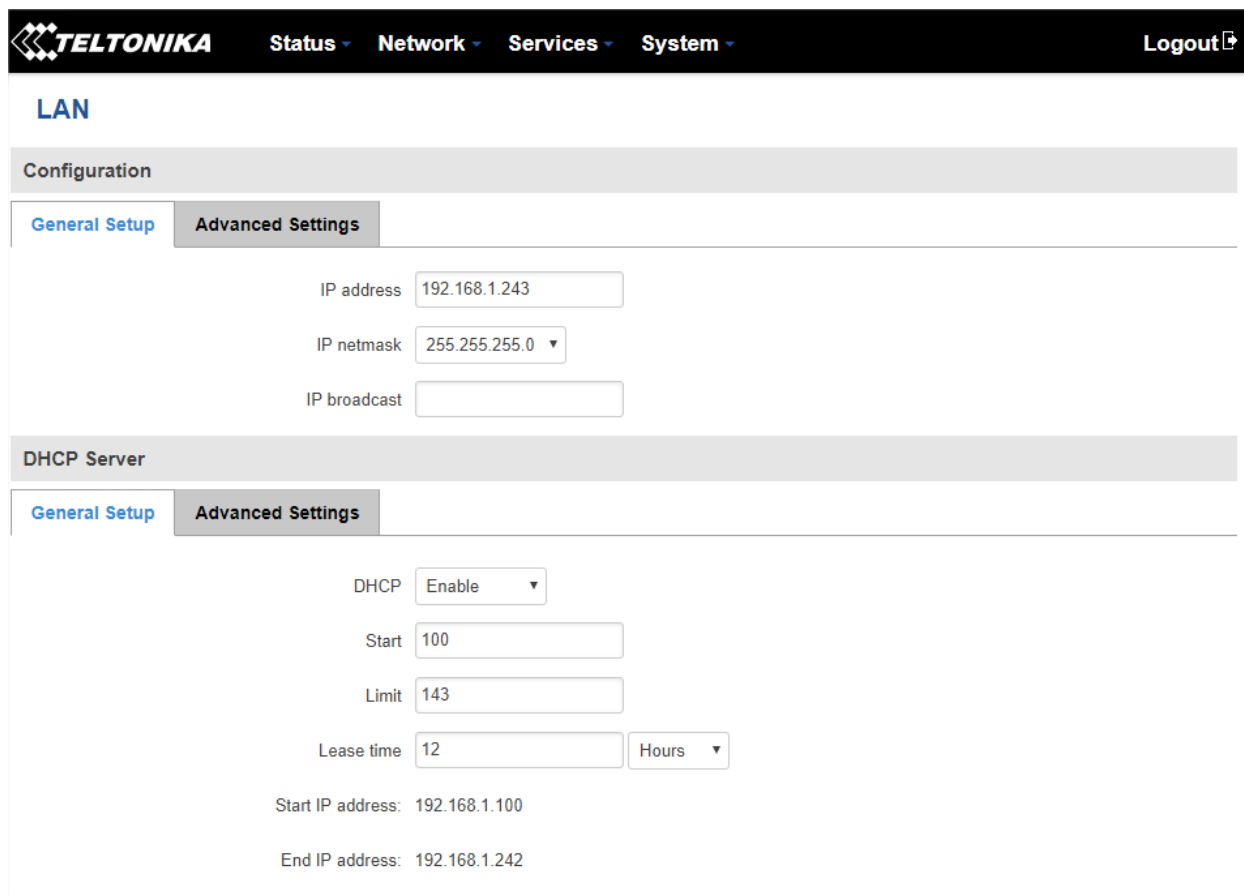


If you need to change the WIFI AP settings or if you need to reconfigure it after factory settings restoration go to the [Appendix 2](#)

9.5.1 LAN configuration

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



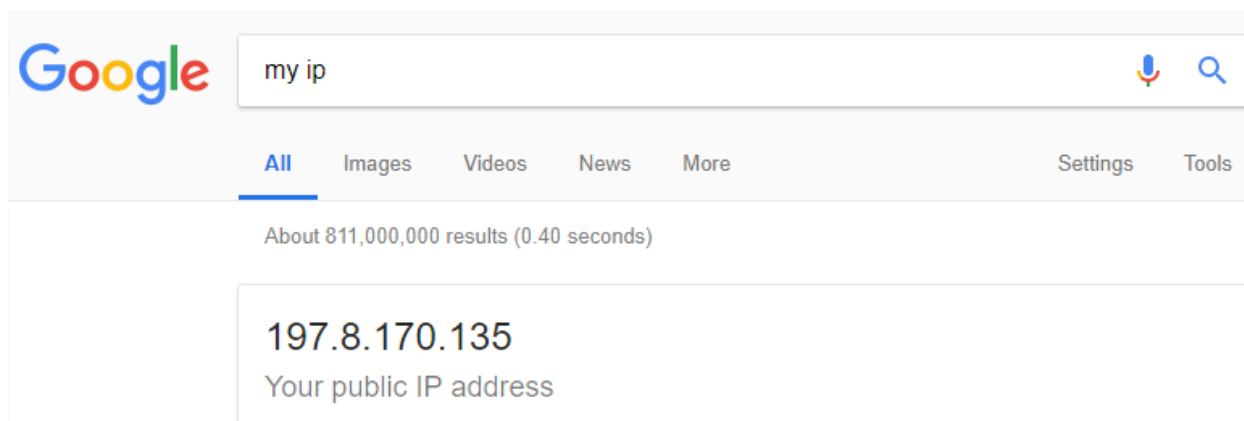


The screenshot shows the Teltonika web interface for LAN configuration. The top navigation bar includes the Teltonika logo and tabs for Status, Network, Services, and System, with a Logout button on the right. The main heading is 'LAN'. Below it is a 'Configuration' section with two tabs: 'General Setup' and 'Advanced Settings'. The 'Advanced Settings' tab is active, showing fields for IP address (192.168.1.243), IP netmask (255.255.255.0), and IP broadcast. Below this is a 'DHCP Server' section, also with 'General Setup' and 'Advanced Settings' tabs. The 'Advanced Settings' tab is active, showing a DHCP dropdown set to 'Enable', a Start field (100), a Limit field (143), a Lease time field (12) with a unit dropdown set to 'Hours', and Start/End IP address fields (192.168.1.100 and 192.168.1.242).

Figure 15 :LAN configuration

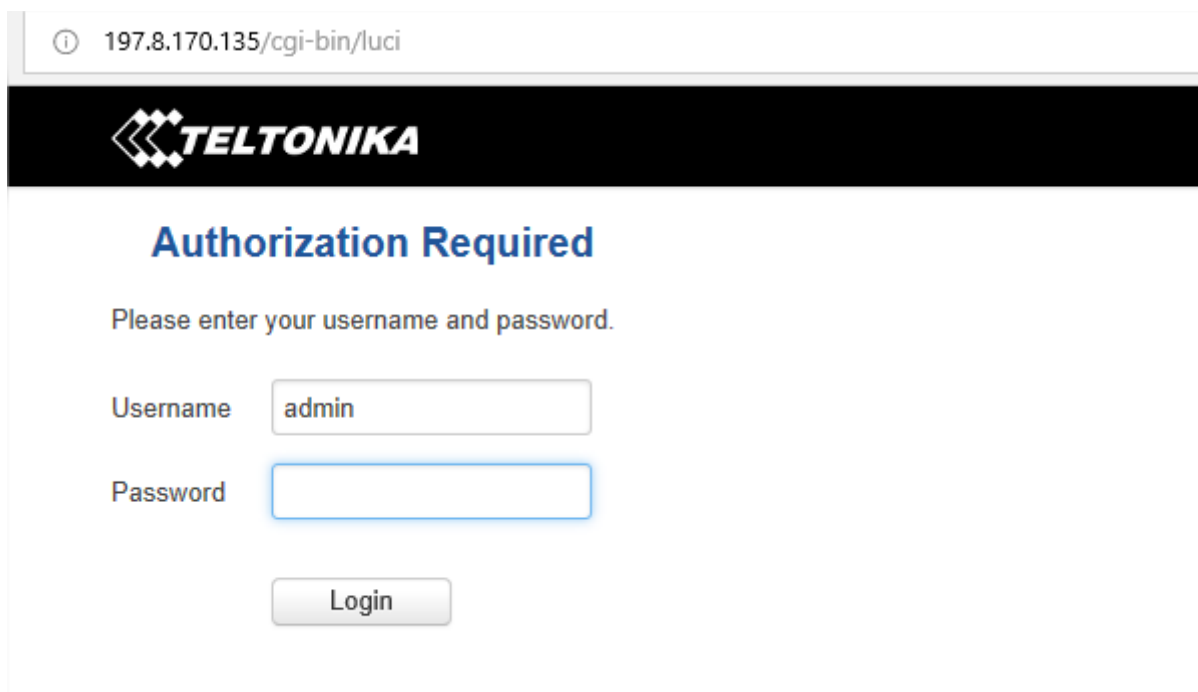
9.5.2 Public IP address and Dynamic DNS

It is recommended that you write down your PUBLIC IP address as we will use it to access this IoT Gateway from monitoring office. 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)



The screenshot shows a Google search result for the query 'my ip'. The search bar at the top contains 'my ip' and a search icon. Below the search bar are tabs for 'All', 'Images', 'Videos', 'News', and 'More', with 'All' selected. To the right are 'Settings' and 'Tools' links. The search results show 'About 811,000,000 results (0.40 seconds)'. The first result is a large box containing the IP address '197.8.170.135' and the text 'Your public IP address' below it.

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.



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 (free or paid as service) to:

- Have DNS for your IoT gateway (so instead of **197.8.170.135** you can have <http://www.muncheninstructsite.publicvm.com>)
- Keeps access to the IoT Gateway® available even with the Public IP is frequently changing.

To enable this method, you should have an account on one of Dynamic DNS providers (For example: DynDNS.net, noip.com, dnsexit.com...etc.)



Most of the time free DDNS service is only free for a period of time (For example 1 month).

After signing up and creating a DDNS (for example: beanairtech.publicvm.com), this should be linked to our Public IP address **197.8.170.135**.

Host Records (A & AAAA)

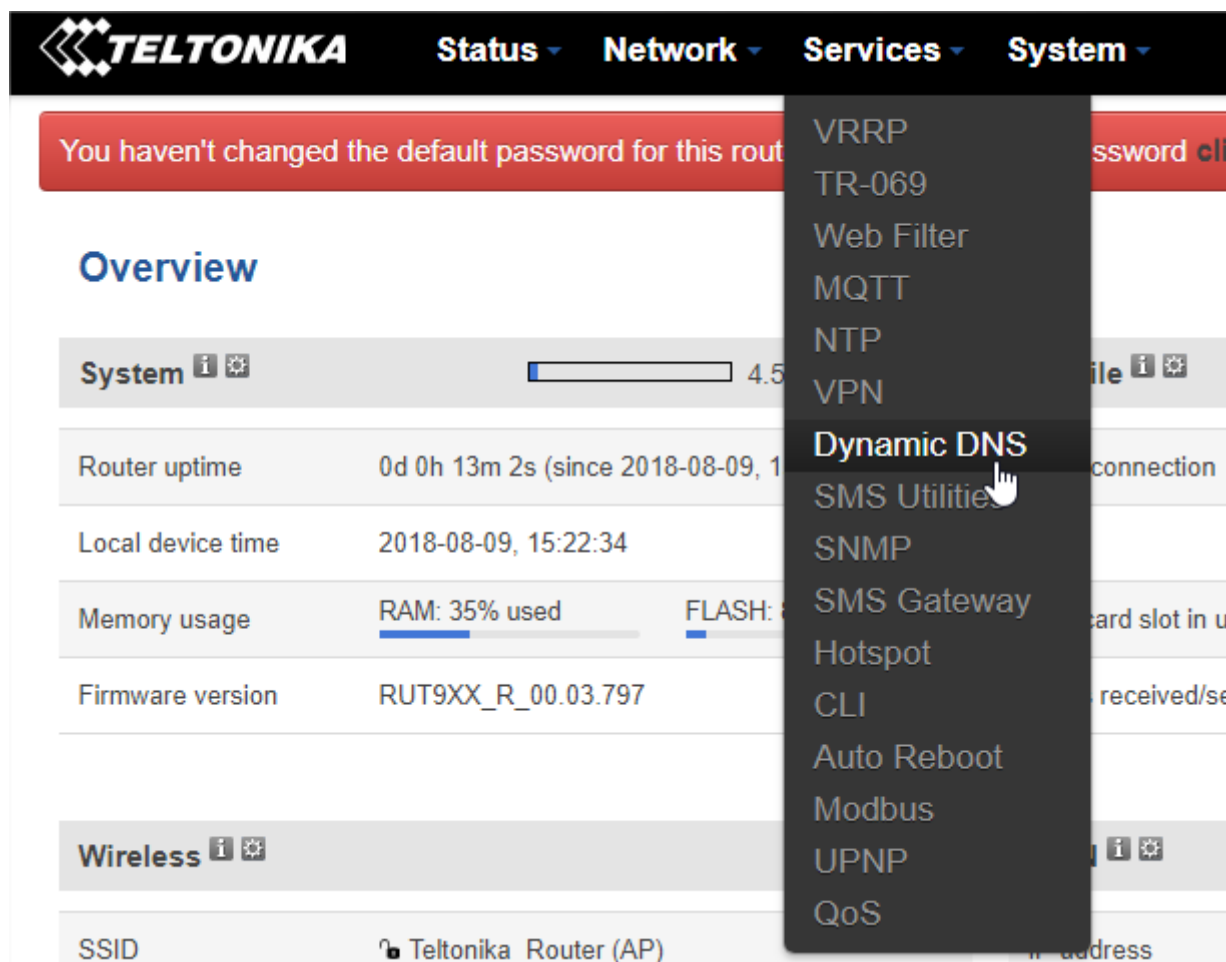
Add Host

? help

Host	IP Address (IPv4 / IPv6)	FO	TTL (hr : min)	Action
beanairtech.publicvm.com.	197.8.170.135	off	00:02	Edit Delete

Next, in the IoT Gateway® side the DDNS client should be configured with the same account settings.

Go to Services tab → Dynamic DNS



Create a new DDNS configuration and then edit to access configuration page.

New configuration name:

MyDDNS	ee	N/A	<input type="checkbox"/>	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
--------	----	-----	--------------------------	-------------------------------------	---------------------------------------

Dynamic DNS

Dynamic DNS allows you to reach your router using a fixed hostname while having a dynamically changing IP address.

DDNS

Enable ☒ ← Check to enable Dynamic DNS

Use HTTPS ☐

Status 2018-08-09, 15:34:10 ← Time of last IP update

Service dnsexit.com ← DDNS Service used(dnsexit)

Hostname www.beanairtech.publicvm ← Hostname

User name beanairtech ← User name & Password

Password ***** ← User name & Password

IP source Custom ← Switch to custom

Private or custom IP source setting, will disable DNS rebinding protection

Network WAN ← Switch to WAN

IP renew interval (min) 10 ← Use default

Force IP renew (min) 472 ← Use default

[Back to Overview](#) [Save](#)

After saving, we can access our network using our DNS

beanairtech.publicvm.com/cgi-bin/luci

TELTONIKA

Authorization Required

Please enter your username and password.

Username

Password

[Login](#)

9.5.3 MQTT Broker Configuration

The screenshot shows the Teltonika web interface for MQTT Broker configuration. The top navigation bar includes the Teltonika logo and tabs for Status, Network, Services, and System. A Logout button is in the top right. Below the navigation bar, there are tabs for Broker and Publisher. The MQTT Broker configuration page is active, showing options to Enable the broker (checked), set the Local Port to 1883, and Enable Remote Access (checked). Below these options is a section for Broker settings with tabs for Security, Bridge, and Miscellaneous. The Security tab is selected, showing a checkbox for Use TLS/SSL (unchecked). A Save button is located at the bottom right of the configuration area.

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.

```
cmd 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>
```

9.6 BEANDEVICE® WILLOW® CONFIGURATION

- 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: beanair2019**
- **security type: WPA2**

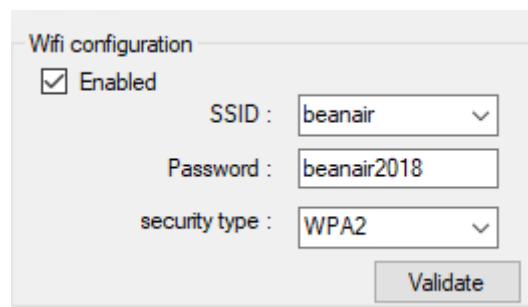


Figure 16 :BeanDevice® Wilow® network settings configuration



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

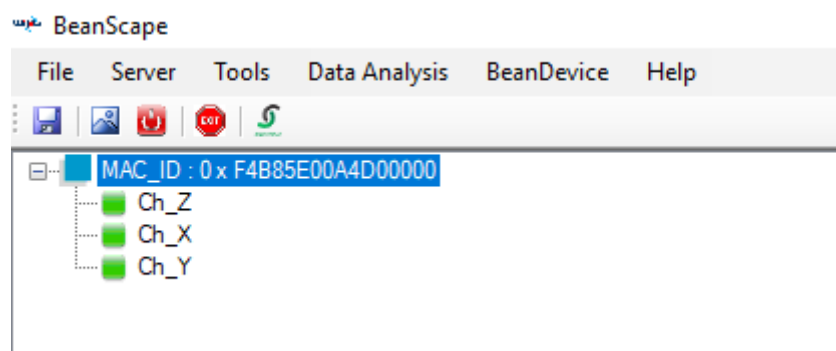


Figure 17 :BeanDevice® Wilow® profile on BeanScape®



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

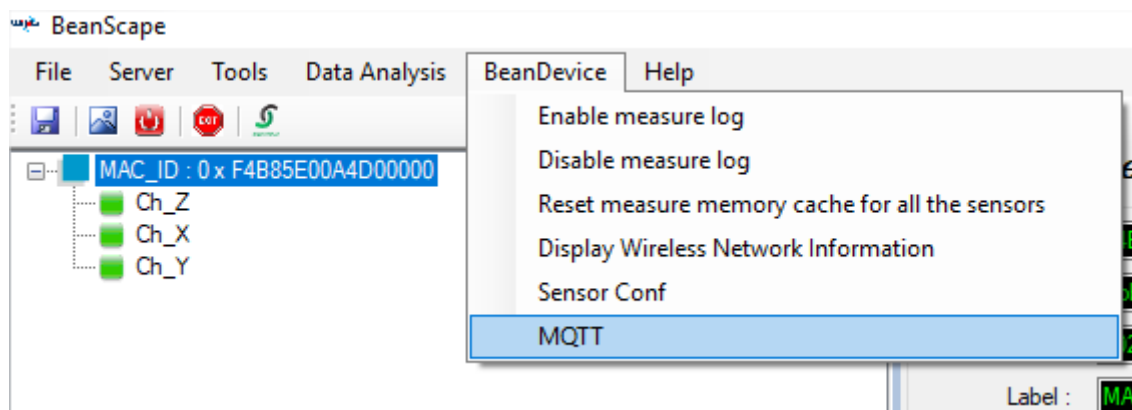


Figure 18 :MQTT configuration

MQTT configuration window will pop up:

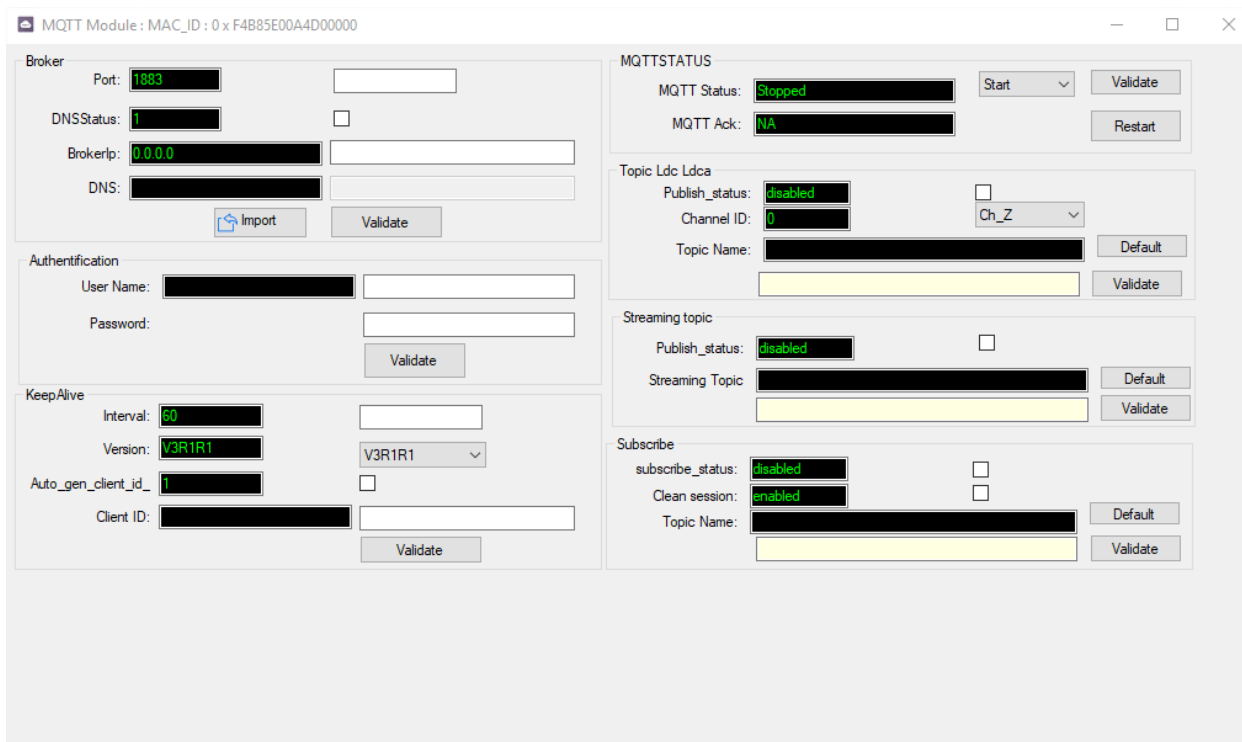


Figure 19 :MQTT configuration window

Follow this screenshot and fill in your Broker settings, then validate:



Before validating, make sure the MQTT module is stopped; otherwise the configuration will not be accepted

- **Port:** TCP/IP port to use with MQTT .1883 is the reserved port to use.
- **DNSStatus:** check if you want to enter your broker DNS. For IoT Gateway we are using IP address
- **BrokerIp:** enter your broker IP address after unchecking DNSStatus .192.168.1.243
- **DNS:** domain name server of your Broker (not used here)

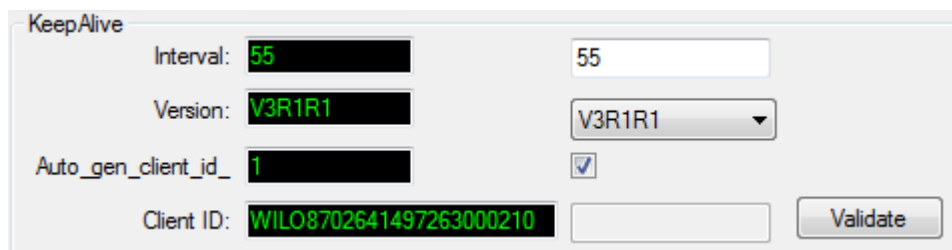
9.6.1 Authentication

MQTT broker can be configured to require client authentication using a valid username and password before a connection is permitted, (not used with IoT Gateway)

- **User Name:** specify your user name
- **Password:** enter your password

9.6.2 Keep alive

The keep alive functionality assures that the connection is still open and both broker and client are connected to one another



KeepAlive

Interval:

Version:

Auto_gen_client_id_ ☒

Client ID:

- **Interval:** The interval is the longest possible period of time, which broker and client can endure without sending a message.
- **Version:** MQTT protocol version
- **Auto_gen_client_ID:** check for auto generate a Client ID
- **Client ID:** Enter your client ID

9.6.3 MQTT Status

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:

- **MQTT Status:** shows the current status of the MQTT module:
 - **Connecting:** trying to establish a connection
 - **Connected:** connection established
 - **Disconnecting:** disconnecting the Client
 - **Stopped:** the connection is stopped
- **Password:** enter your password
- **Start/Stop:** select and **Validate** to start or stop your MQTT Client connection
- **Restart:** restart your connection

9.6.4 Topic related to static measurement

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: **enabled** ☐

Channel ID: **0** Ch_Z

Topic Name: **F4B85E00A4D00000/SENSOR/0**

- **Publish_status:** check and **validate** to enable publishing
- **Channel ID :** channel identification
- **Topic Name:** Field to enter your topic's name

9.6.5 Topic related to dynamic measurement

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: **enabled** ☐

Streaming Topic: **F4B85E00A4D00000/STREAMING**

- **Publish_status:**check and **validate** to enable publishing
- **Streaming Topic:** Text field to enter your streaming topic's name

9.6.6 Subscribe

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.

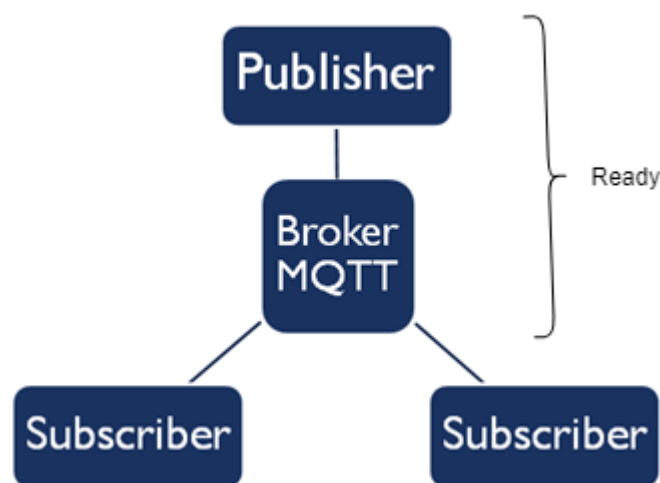
Subscribe

subscribe_status: ☒ enabled ☐

Clean session: ☒ disabled ☐

Topic Name:

- **Subscribe_status:** check and **validate** to enable subscribing
- **Clean session:** check and validate to enable, then the client does not have a persistent session and all information are lost when the client disconnects for any reason
- **Topic Name:** Field to enter your topic's name to subscribe to



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

Custom display Notes Status Measurement conditioning calibration MQTT Conf Log config. /

Topic LDC / LDCA

Topic Name:

Retain Flag: ☒ disabled

Publishing: ☒ enabled

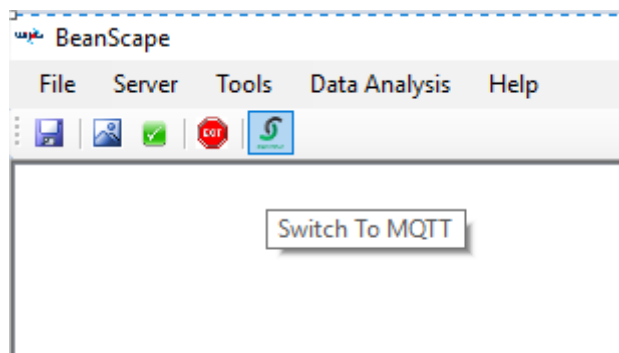
All you have to do now is to write down your Subscribe Topic name and save it as we will use it to connect to the BeanDevice wilow from monitoring location.(For example: [F4B85E00A4D00000/OTAC](#))

9.7 ENABLING THE REMOTE ACCESS AT YOUR OFFICE

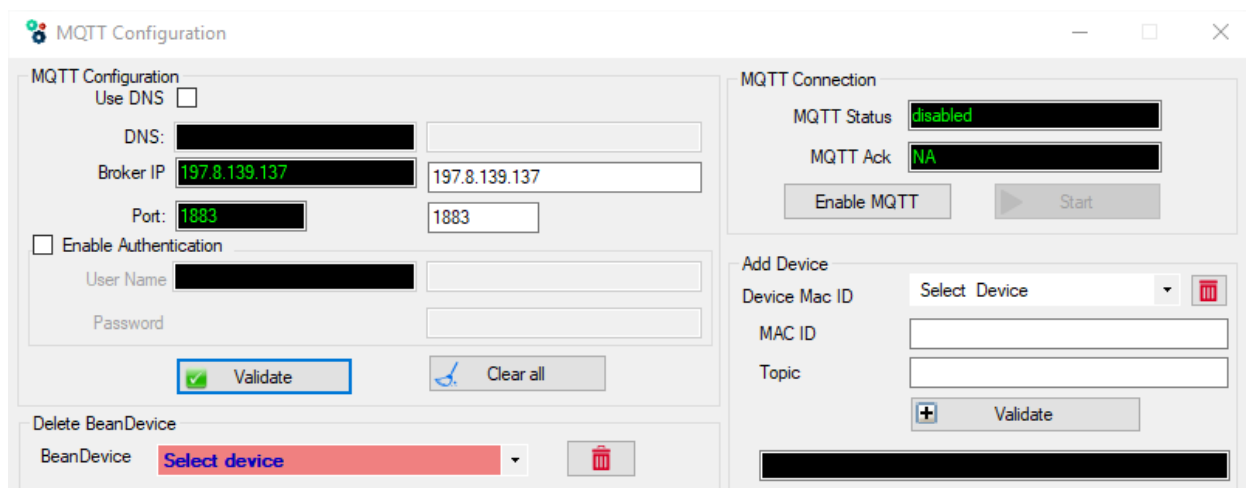
9.7.1 BeanScape® RA configuration

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 ,

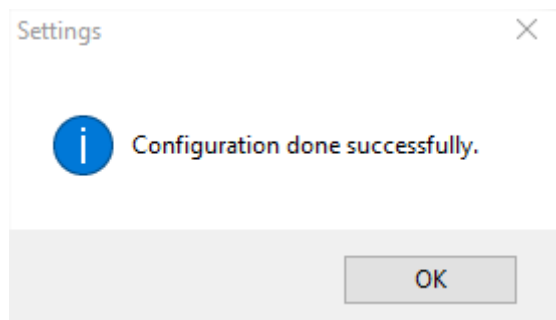


- In Broker IP you have to enter the IoT Gateway WAN IP Address, you can retrieve that from the interface we previously connected to .
- Port should be set to 1883 then validate

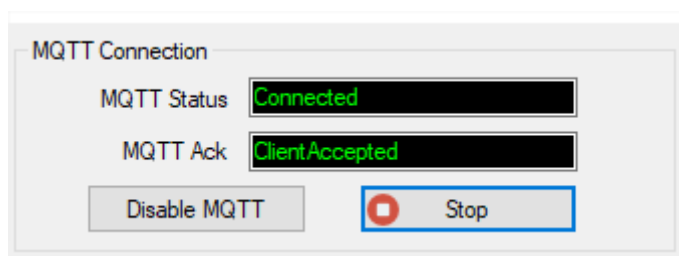


WAN IP address should be the same as the Public IP address you look at using What's My IP site (using browser) during connection to the IoT gateway.

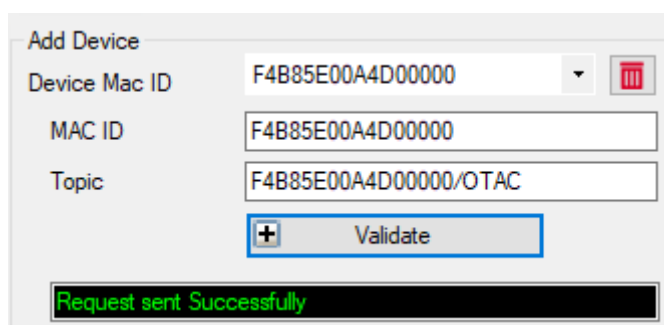
A successful configuration acknowledgement window will pop up .



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



- 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 .



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

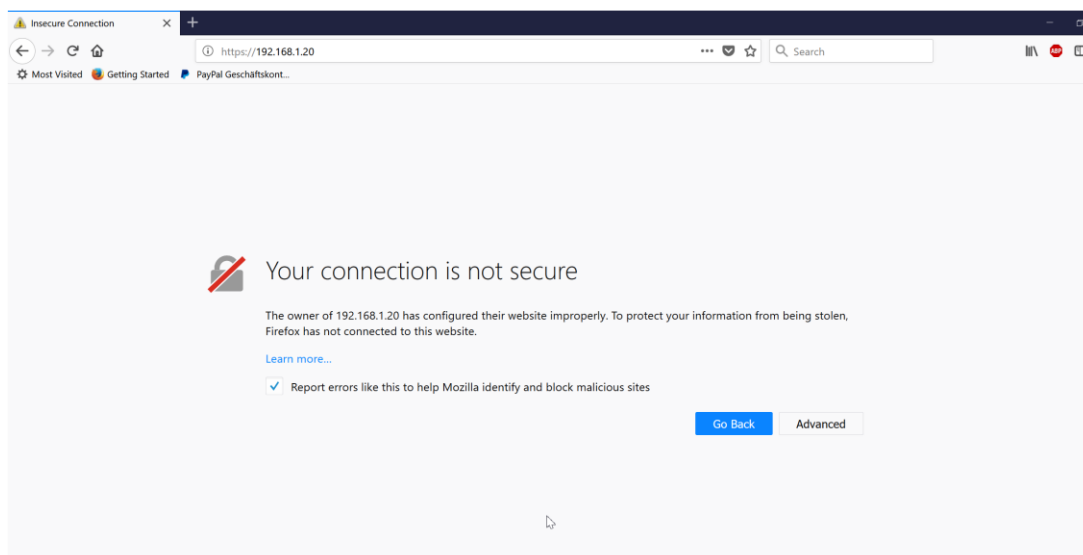
Mqtt Status : Connected

10.APPENDIX 1: WIFI AP WITH WDS FUNCTION - BULLET M2 HP CONFIGURATION (IF FACTORY SETTINGS ARE RESTORED)

Using the Ethernet connector, you will find inside, you connect to your PC to access the Wi-Fi access point configuration interface. By default its IP address is set to **192.168.1.20**, the username is **ubnt** and the password is **beanair**



Warning message can be displayed by your browser, you should click on continue anyway



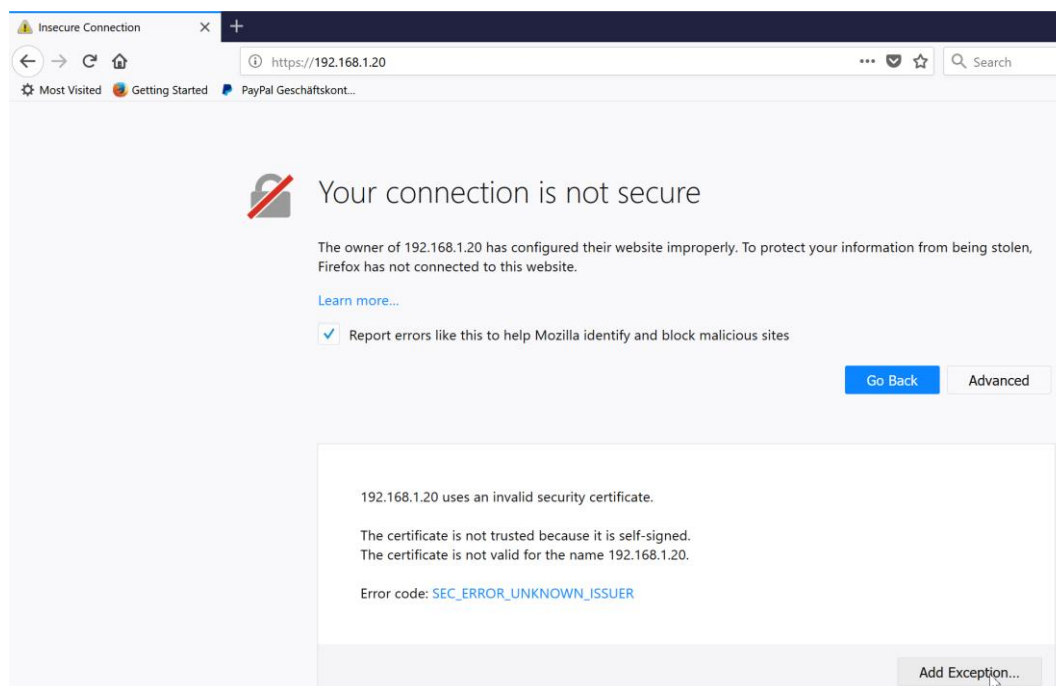


Figure 20: A Screenshot of warning message

10.1 AIRMAX FUNCTION

After logging, you will have to configure these different settings on the access point:

- Select the first tab and disable **AirMax**

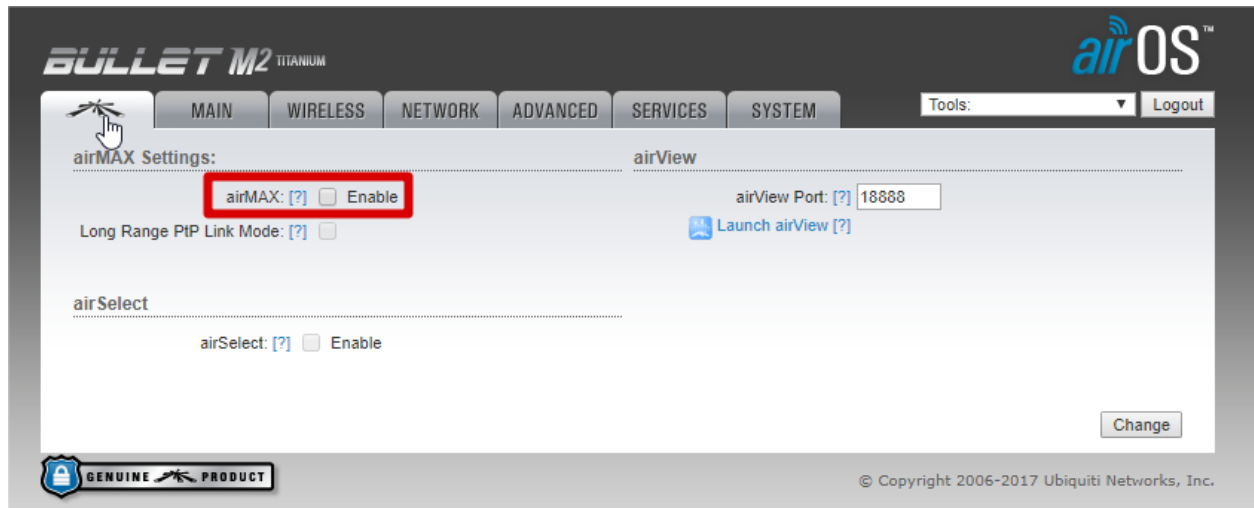


Figure 21: Airmax function should be disabled

10.2 WIRELESS CONFIGURATION

The screenshot displays the airOS web interface for a BULLET M2 device. The top navigation bar includes tabs for MAIN, WIRELESS, NETWORK, ADVANCED, SERVICES, and SYSTEM. The WIRELESS tab is active, showing the 'Basic Wireless Settings' page. The settings are as follows:

- Wireless Mode: Access Point
- WDS (Transparent Bridge Mode): ☒ Enable
- SSID: Beanair
- Country Code: Germany
- IEEE 802.11 Mode: B/G/N mixed
- Channel Width: 20 MHz
- Frequency, MHz: auto
- Extension Channel: None
- Frequency List, MHz: ☒ Enable, 2437
- Calculate EIRP Limit: ☒ Enable
- Antenna Gain: 0 dBi
- Cable Loss: 0 dB
- Output Power: 19 dBm
- Data Rate Module: Default
- Max TX Rate, Mbps: MCS 7 - 65/72.2
- Auto: ☒

The 'Wireless Security' section is also visible, with the following settings:

- Security: WPA2-AES
- WPA Authentication: PSK
- WPA Preshared Key: [masked]
- MAC ACL: ☐ Enable

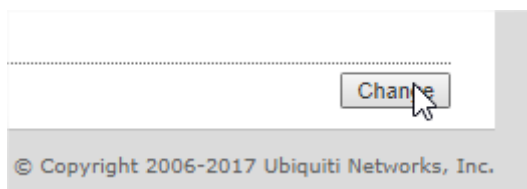
A 'Change' button is located at the bottom right of the settings area. The footer includes a 'GENUINE PRODUCT' logo and the copyright notice: © Copyright 2006-2019 Ubiquiti Networks, Inc.

Figure 22: Wireless Configuration - WIFI AP

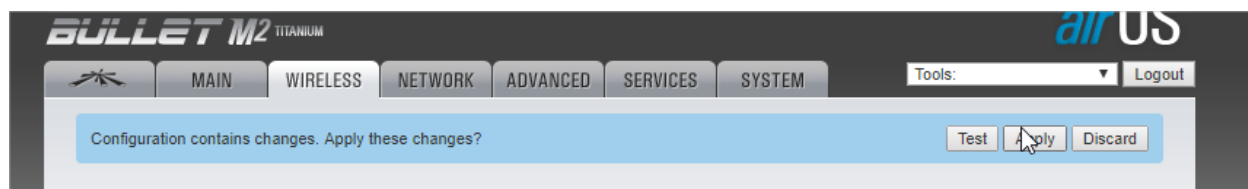
- Select the Wireless Mode as **Access Point**
- Check **WDS (Transparent Bridge Mode)**
- SSID is **Beanair**
- Select your country
- IEEE 802.11 Mode to **B/G/N mixed**
- Channel width to **20 MHz**
- Frequency to **2437 MHz (BeanDevice® Wilow® can't work on all the WIFI frequencies)**

- Extension channel to **None**
- Frequency List, MHz Is **Enabled**
- Calculate EIRP Limit is **Enabled**
- Leave the next 4 lines to default (as shown in the screenshot below)
- Set your security to **WPA2-AES** with WPA Authentication set to PSK
- WPA Preshared key is **beanair2019**
- MAC ACL is **disabled**

After all modifications set, click on change then apply



Make sure to click on apply otherwise your configuration is not modified



10.3 NETWORK CONFIGURATION

- Next, move to the Network Tab, make sure the network Mode is set to **Bridge** and IP address management is Static with IP Address defined at **192.168.1.20** with Gateway IP set to **192.168.1.1**

The screenshot displays the web interface of a BULLET M2 TITANIUM device. The top navigation bar includes tabs for MAIN, WIRELESS, NETWORK, ADVANCED, SERVICES, and SYSTEM. The NETWORK tab is selected. Below the navigation bar, there are three expandable sections: Network Role, Configuration Mode, and Management Network Settings. The Network Role section shows Network Mode set to Bridge and Disable Network set to None. The Configuration Mode section shows Configuration Mode set to Simple. The Management Network Settings section shows Management IP Address set to Static with IP Address 192.168.1.20, Netmask 255.255.255.0, and Gateway IP 192.168.1.1. Other settings include Primary DNS IP, Secondary DNS IP, MTU 1500, Management VLAN (disabled), Auto IP Aliasing (enabled), and STP (disabled). An IPv6 section is also visible with an Enable checkbox. A Change button is located at the bottom right of the settings area.

After all modifications set, click on change then apply ,the access point is now well configured and ready to use ,you can continue with your deployment setup.

10.4 FIRMWARE UPDATE

Go on [System](#), then click on choose File to select the latest Bullet M2 HP firmware coming with the following format:
XW.vVERSION.XXXX.XXXX.XXXX.bin

You can find Buller M2 HP Firmware:

- Ubiquiti website – download page
- Beanair® website – Wilow® Firmware

The screenshot shows the 'SYSTEM' configuration page for the BULLET M2 device. The page has a dark header with the 'BULLET M2' logo and 'airOS' branding. Navigation tabs include MAIN, WIRELESS, NETWORK, ADVANCED, SERVICES, and SYSTEM. The 'SYSTEM' tab is active, showing a 'Firmware Update' section with fields for Firmware Version (XW.v6.1.9), Build Number (32918), and an 'Upload Firmware' button. Below this are 'Device' settings (Device Name: Bullet M2, Interface Language: English) and 'Date Settings' (Time Zone: (UTC/GMT) Universal Time, Startup Date: Enable). The 'System Accounts' section shows the Administrator User Name (ubnt) and a 'Read-Only Account' checkbox. The 'Miscellaneous' section includes a 'Reset Button' checkbox and 'Location' fields for Latitude and Longitude. A 'Change' button is at the bottom right.

BULLET M2 **airOS™**

MAIN WIRELESS NETWORK ADVANCED SERVICES **SYSTEM** UNMS Tools: Logout

Firmware Update

Firmware Version: XW.v6.1.9 Upload Firmware: Choose File No file chosen
Build Number: 32918
Check for Updates: ☒ Enable Check Now

Device **Date Settings**

Device Name: Bullet M2 Time Zone: (UTC/GMT) Universal Time
Interface Language: English Startup Date: ☐ Enable
Startup Date: [Calendar Icon]

System Accounts

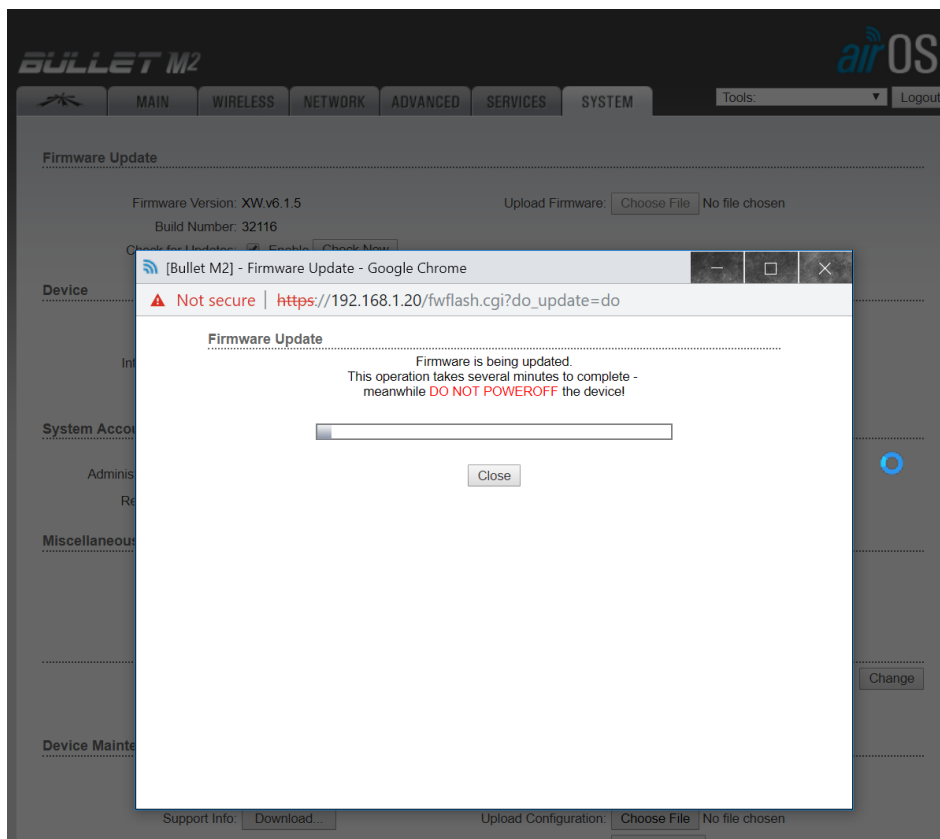
Administrator User Name: ubnt
Read-Only Account: ☐ Enable

Miscellaneous **Location**

Reset Button: ☒ Enable Latitude: [Field]
Longitude: [Field]

Change

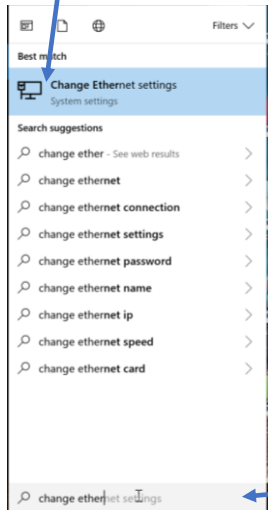
Then firmware update can restart:



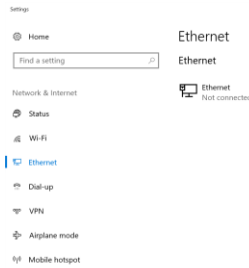
11. APPENDIX 2: LTE ROUTER CONFIGURATION (IF FACTORY SETTINGS ARE RESTORED)

11.1 GET AN ACCESS TO YOUR LTE ROUTER

2. Select **Ethernet Settings**

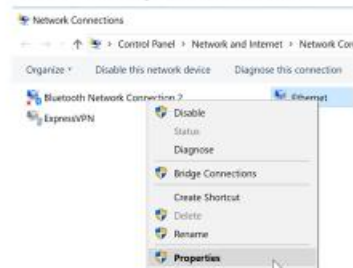


3. A new window pop-up's , select **Change adapter options**

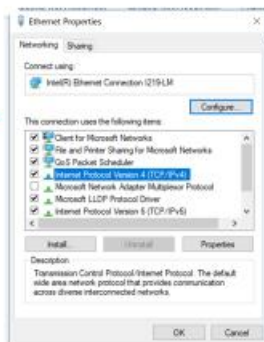


1. Use the search tool, type in Change Ethernet Settings

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

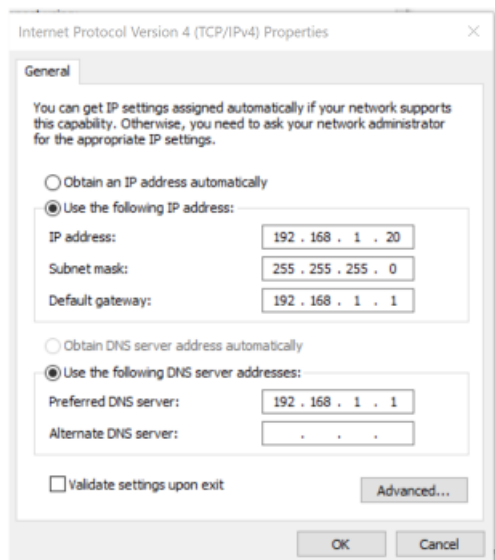


5. Click on Properties, then select **Internet Protocol Version 4 (TCP/IPv4)** then click on **Properties**



6. By default DHCP is enabled on your PC, i.e. IP address can be automatically allocated

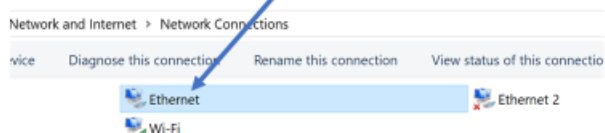




7. Choose Manual IP configuration

- First select an IP address. The 4G router is configured with the default IP Address **192.168.1.1**. You can enter an IP in the form of 192.168.1.XXX, where XXX is a number in the range of **2-254**.
Avoid to use the same IP address than your 4G Router which is **192.168.1.1**
- Enter 255.255.255.0 for your subnet mask
- The default gateway must come with the same IP address that your 4G Router **192.168.1.1**
- 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



8. Now that your PC's Ethernet network settings are configured, launch your browser (Mozilla or Chrome, Adblocker should be disabled) and enter your Router's IP into the the address field: 192.168.1.1

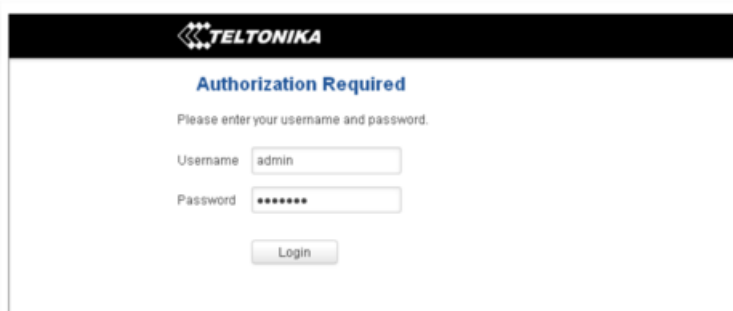


9. Enter username and password, by default these settings are:

Username: admin

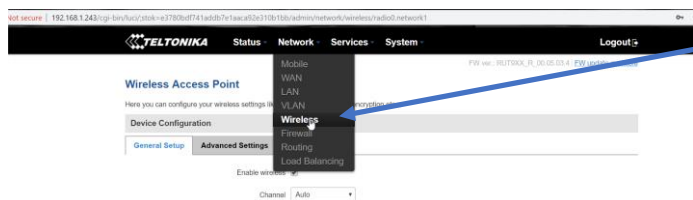
Password: admin01

then click on login, you will get logged into your 4G Router

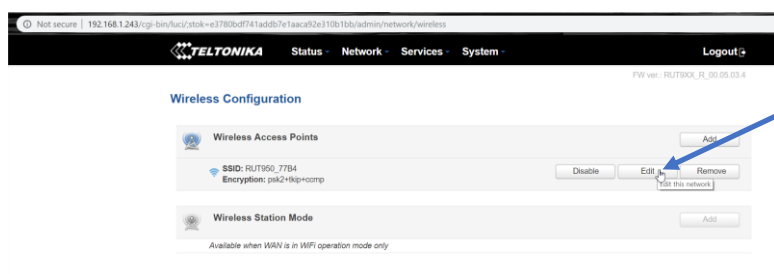


11.2 INTERNAL WIFI AP CONFIGURATION

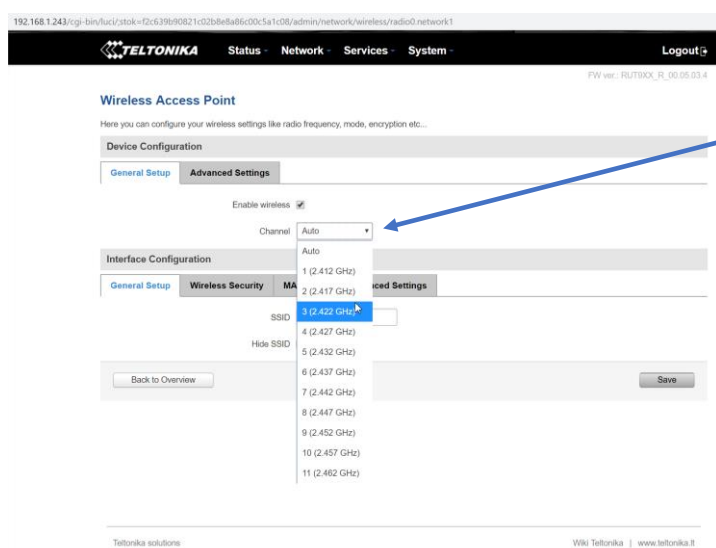
11.2.1 Case 1: Using Internal WIFI AP



1. Click on Network then wireless



2. Edit to configure your SSID and Password



3. Select your WIFI channel between 1 and 11



As Wilow® device comes with both CE and FCC certifications. It's compatible with North America WIFI, it will not work on Channels 12,13 and 14

4. Choose your SSID , Example : Beanair

5. Choose the encryption WPA2-PSK
Cipher : Auto
Key: choose a strong key that you can remember , example: **Beanair2019**

6. Click on save

7. Click on Status the Overview,
you can check your WIFI Network
status

11.2.2 Case 2: Using external WIFI AP with WDS function

If you are using External WIFI AP with WDS function, Disable the Wi-Fi Access point function on your LTE Router

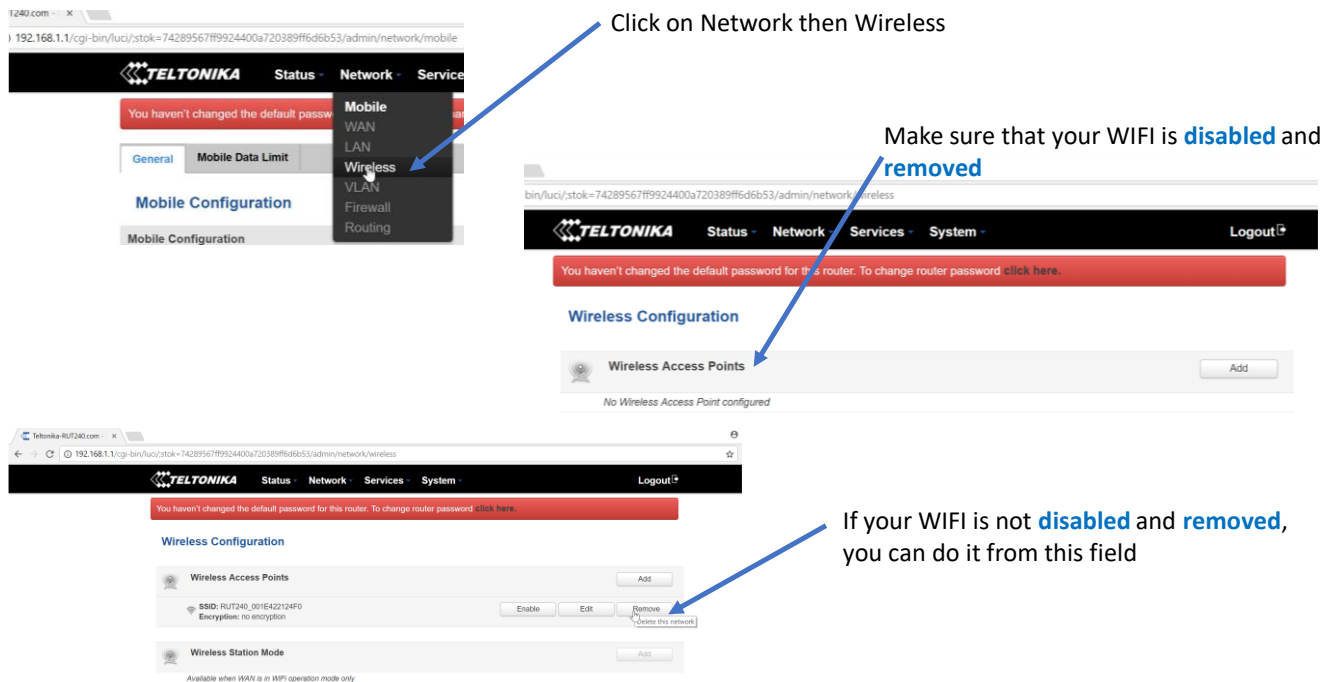
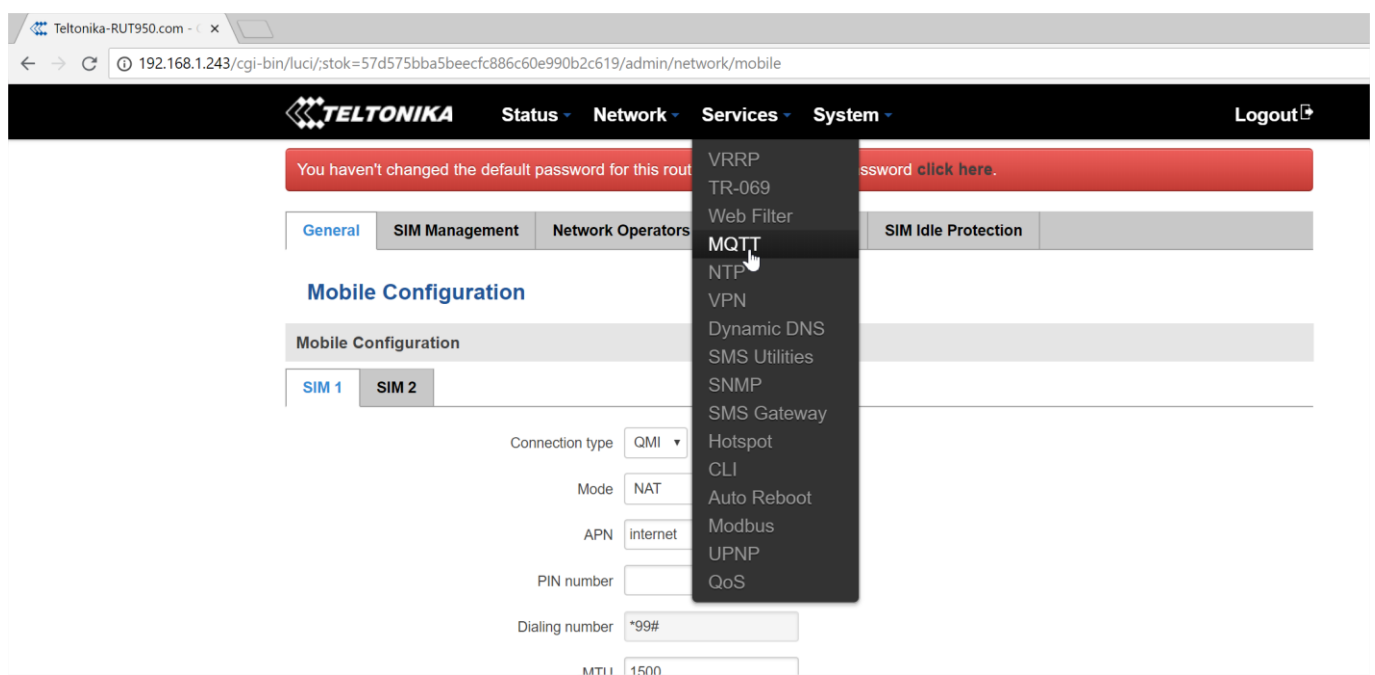


Figure 23: WIFI Access Point should be disabled


11.3 ENABLE YOUR MQTT BROKER

Click on **Services** Tab then **MQTT**



Click on **Enable MQTT Broker**, use the Local Port **1883** and click on **Enable Remote Access**

in/luci/stok=57d575bba5beecfc886c60e990b2c619/admin/services/mqtt


Status ▾ **Network** ▾ **Services** ▾ **System** ▾ **Logout**

You haven't changed the default password for this router. To change router password [click here](#).

Broker **Publisher**

MQTT Broker

Enable ☒

Local Port

Enable Remote Access ☒

Broker settings

Security **Bridge** **Miscellaneous**

Use TLS/SSL ☐

Save

Figure 24: MQTT Broker configuration