BeanDevice®

TECHNICAL NOTE

MQTT TOOLKIT FOR WILOW®
(WIRELESS IIOT SENSORS) USER GUIDE

BeanAir
Rethinking Sensing Technology

Wilow
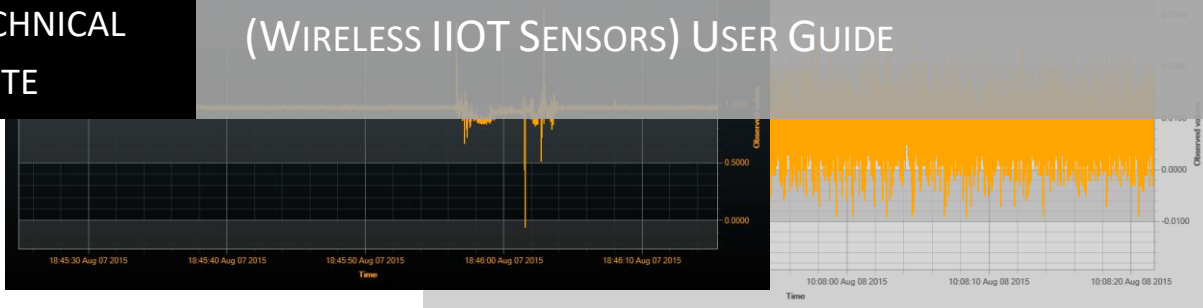
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For general contact, technical support, to report documentation errors and to order manuals, contact *BEANAIR® Technical Support Center* (BTSC) at:

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).

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2. VISUAL SYMBOLS DEFINITION

Visual	Definition
	Caution or Warning – 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.
	Danger – This information MUST be followed if not you may damage the equipment permanently or bodily injury may occur.
	Tip or Information – Provides advice and suggestions that may be useful when installing Beanair Wireless Sensor Networks.

3. AIM OF THE DOCUMENT

The aim of this document is to demonstrate a simple integration of the BeanDevice® Wilow in the Internet of things ecosystem using cutting-edge technology, this will be very important for a countless possibilities of measurements, collecting, analyzing and processing the data.

1. OVERVIEW

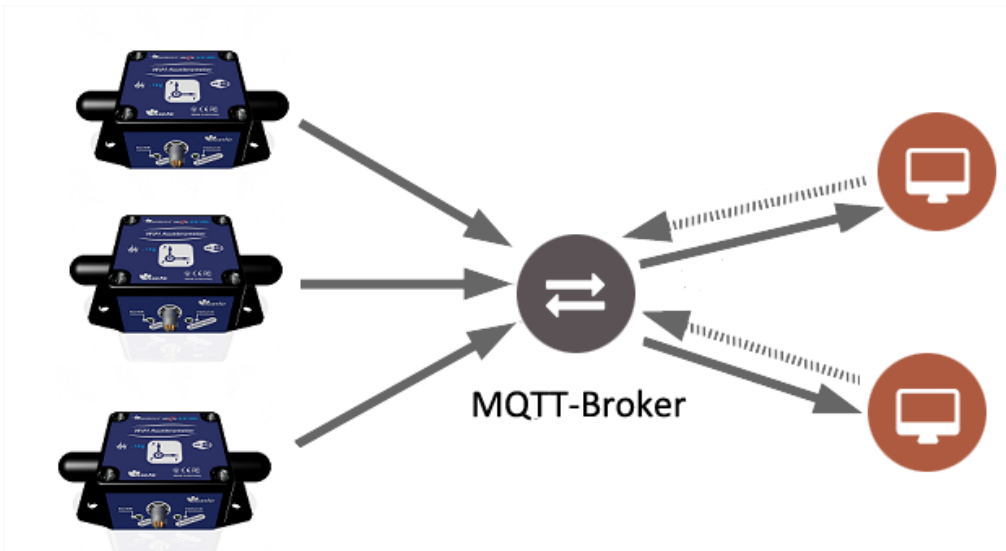The idea is to introduce the BeanDevice to the internet of things using the MQTT protocol

Figure 1: System diagram

We can install and use local MQTT broker or use a free of cost online broker (limited). The BeanDevice will publish data to all subscribed devices on its topic, and we can publish configuration (change acquisition mode, restart BeanDevice ...set sleep mode) to a subscribed BeanDevice.
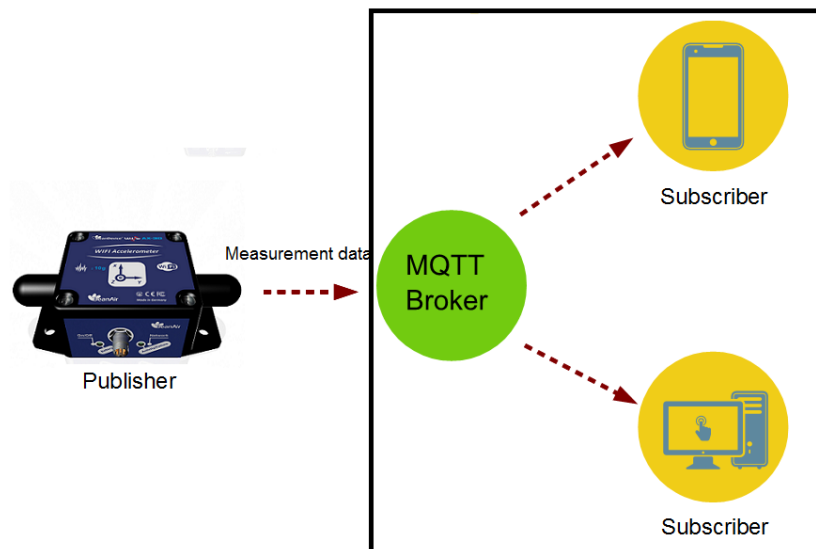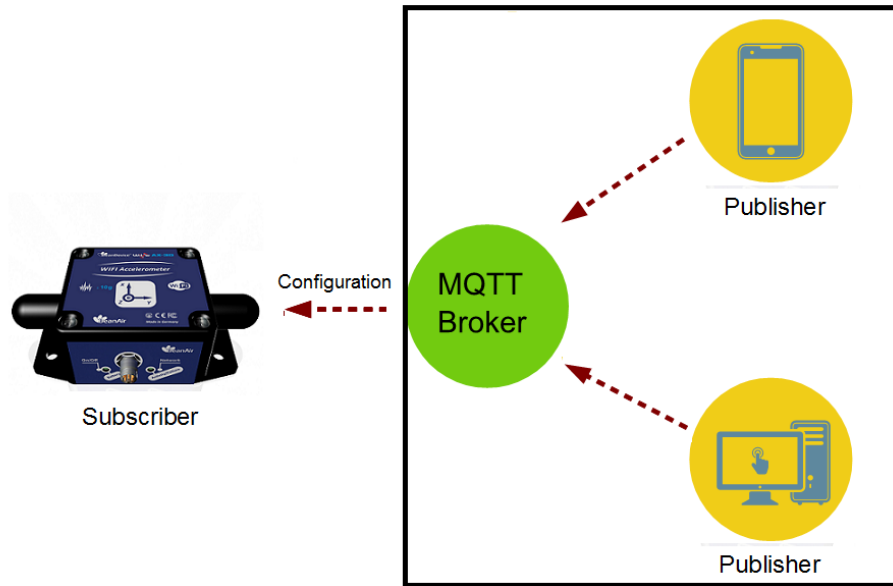

Figure 2: Data collection

Figure 3: BeanDevice Configuration over MQTT

2. INSTALATION AND ENVIRONMENT CONFIGURATION

2.1 SIMPLE SOLUTION

2.1.1 Network

To get started using Our BeanDevice Wilow over MQTT and before starting the configuration we need to install an MQTT broker on any embedded computer or SBC of your choice(Raspberry PI,Beaglebone black,..)Alternatively, even use a windows system (like in this example), also we can simply use an online broker (free with limits), next we build our WiFi network and make sure we have the network architecture as shown in the figure below.
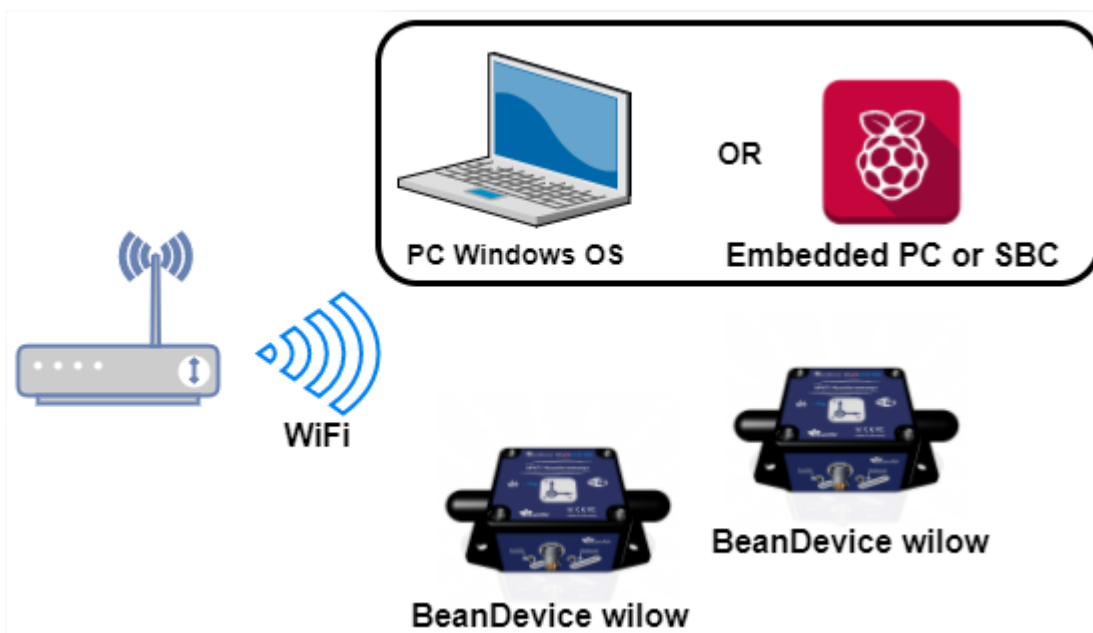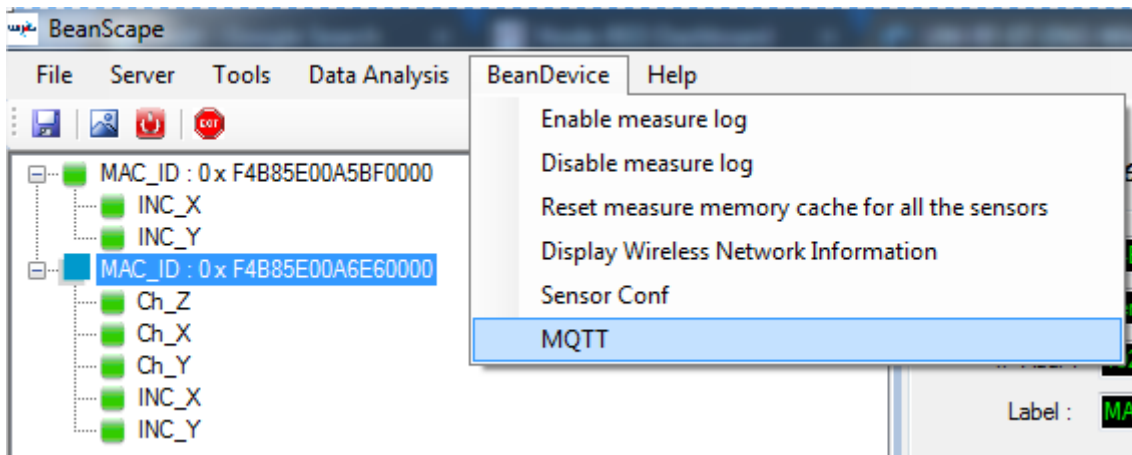

Figure 4: Local network configuration

2.1.2 Configuration

In order to start the MQTT communication we have to setup the MQTT configuration using BeanScape, after connecting the BeanDevice to the network (find more details in our YouTube video: getting started with BeanDevice Wilow).Select your BeanDevice and scroll down to MQTT in the BeanDevice tab.
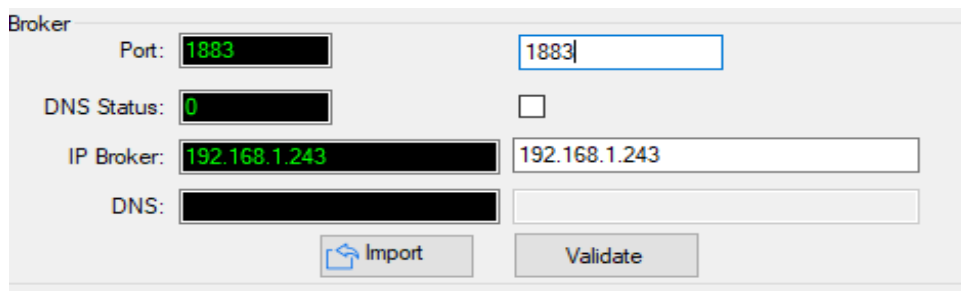
A new window will pop up and it is where we will configure the BeanDevice MQTT module.
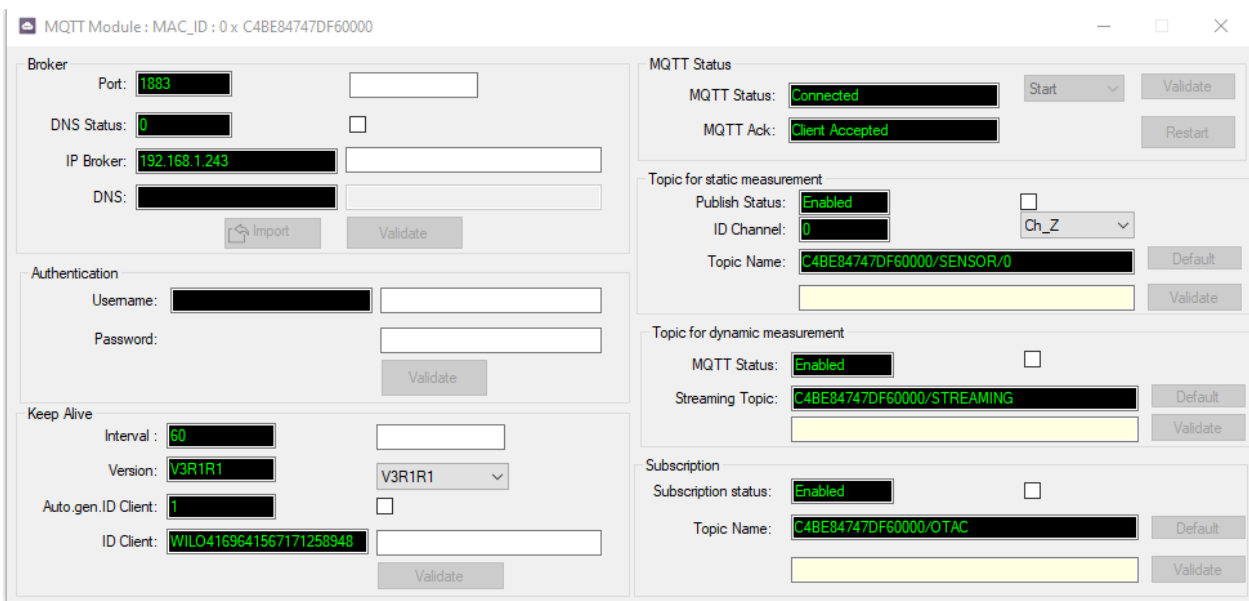
2.1.2.1 Broker

Using IP broker:

Using DNS broker :public MQTT broker ("iot.eclipse.org": free with limits)

- **Port**: TCP/IP port to use with MQTT .1883 and 8883 are the reserved ports for use with MQTT
- **DNS Status**: check if you want to enter your broker DNS.DNSStaus is 1
- **BrokerIp**: enter your broker Ip address after unchecking DNSStatus .DNSStatus is 0
- **DNS**:domain name server of your Broker

2.1.2.2 Keep alive

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

- **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

2.1.2.3 Authentication

MQTT broker can be configured to require client authentication using a valid username and password before a connection is permitted.

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

2.1.2.4 MQTT STATUS

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

- ■ *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

2.1.2.5 Topic for static measurement

The topic is a string used by the broker to filter messages for each connected client and in our case; it is the Topic that will help receive measurements from the sensors (LowDutyCycle and Alarm modes) .for a better organization keep your Topic as follow:

BeanDevice_MAC-ID/Channel

For Example: **C4BE84747DF60000** CHX for the channel x on that BeanDevice with that MAC ID

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

2.1.2.6 Streaming topic

Here it is the Topic for streaming measurements, for a better use and follow the labeling standard:

BeanDevice_MAC-ID

For Example: **C4BE84747DF60000**

- 🔷 *Publish_status:*check and **validate** to enable publishing
- 🔷 *Retain Flag:* Check and **validate** to enable retain flag
- 🔷 *Streaming Topic:* Text field to enter your streaming topic's name

2.1.2.7 Subscribe

The BeanDevice will subscribe to a another MQTT client who will publish configuration messages,

- 🔷 *Subscribe status:* check and **validate** to enable subscribing
- 🔷 *Topic Name:* Field to enter your topic's name to subscribe to

2.1.3 Tests

After configuring the BeanDevice MQTT module and setting the BeanDevice to Streaming, SET or shoc detection acquisition mode we can check the configuration by subscribing to its topic using a desktop MQTT test client and an ip address of local broker or public MQTT broker (iot.eclipse.org)

MQTT toolkit only works when setting the BeanDevice to **STREAMING**, **SET** or **shock Detection** acquisition mode.
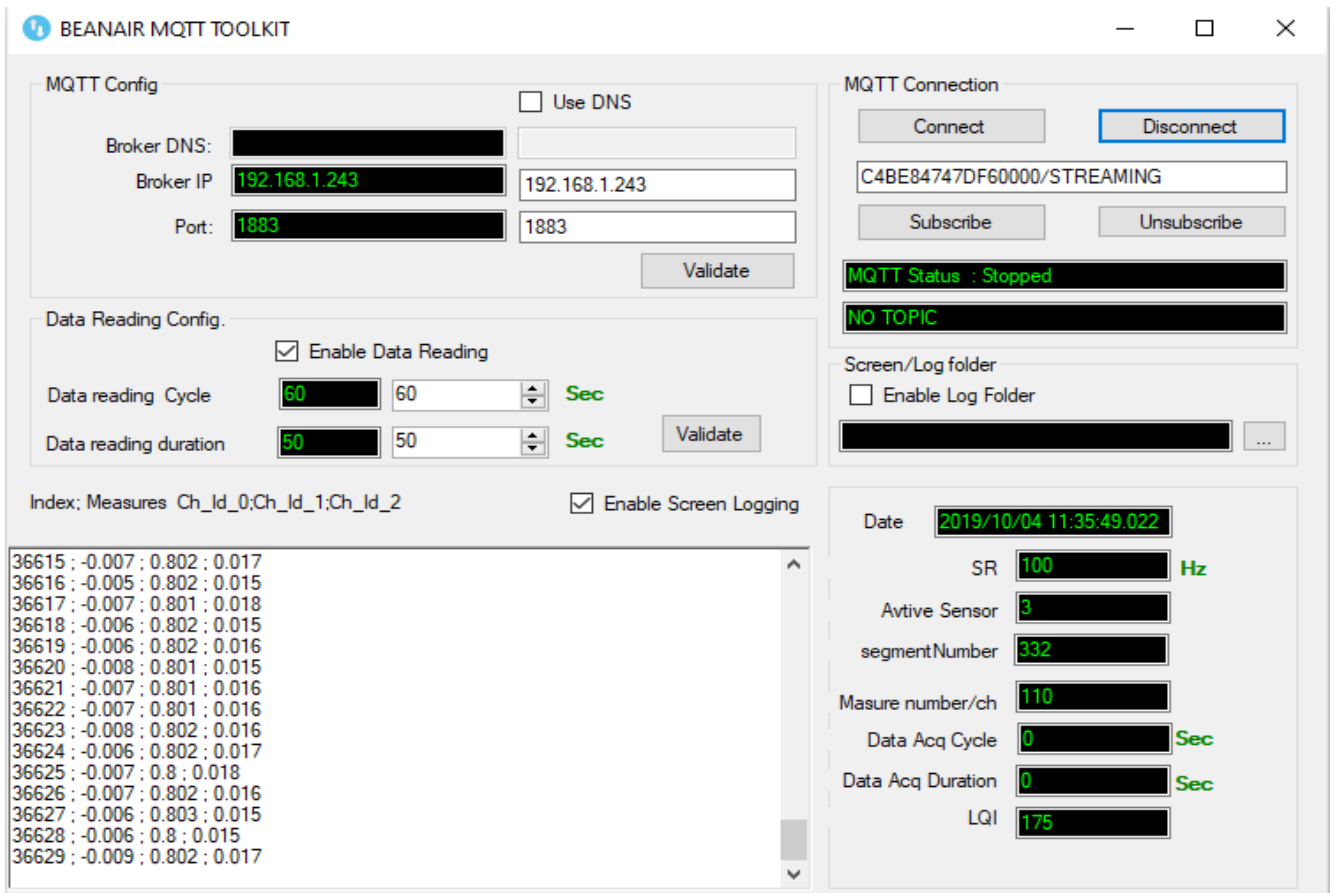

Figure 5: Beanair MQTT toolkit

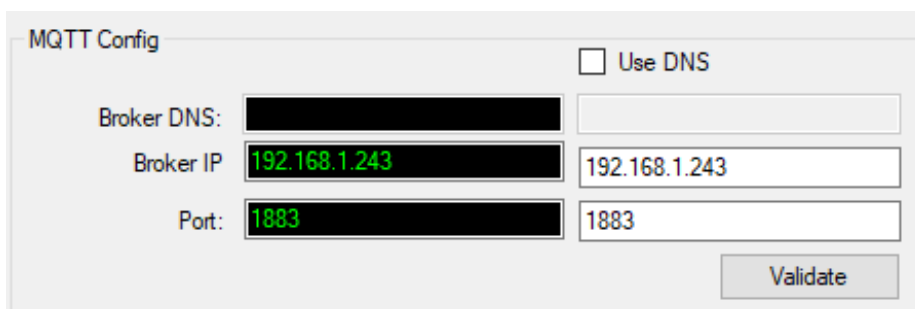2.1.3.1   Beanair MQTT toolkit (MQTT Configurations)

Figure 6: MQTT configuration

- *Broker DNS*: domain name server of your Broker

- *Broker IP:* enter your broker Ip address.

- *Port*: TCP/IP port to use with MQTT .1883 and 8883 are the reserved ports for use with MQTT.

Make sure to choose the same Broker ip or Dns used in the MQTT configuration of Beanscape.

2.1.3.2   Data Reading Config

Figure 7: Data Reading Config

- 🔷 *Data Reading Cycle*: Cycle of data reading

- 🔷 *Data Reading Duration:* duration in which data is displayed in the MQTT toolkit

  Example: in every 60 Sec data will be displayed for 50 Sec

- 🔷 *Enable/Disable Data Reading:* only Data will be displayed continuously when data reading is not enabled.
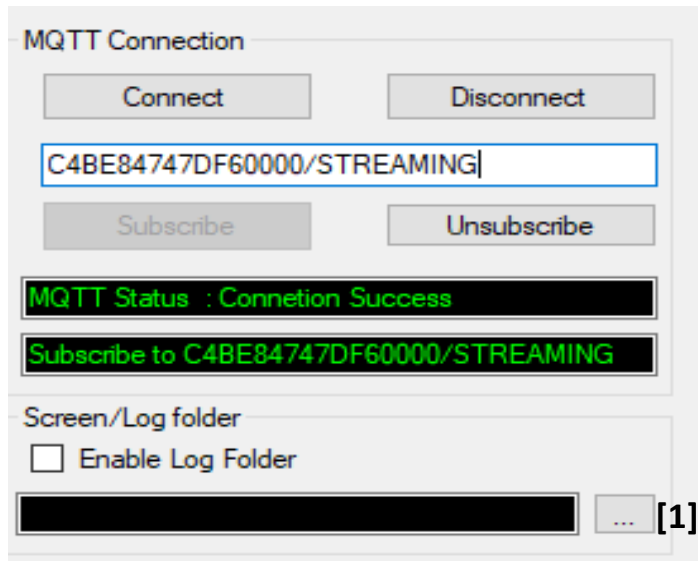
2.1.3.3   MQTT connection

Click on Connect

Add the same streaming topic you added in the Beanscape MQTT module

Clickon Subscribe

Figure 8 :Connection & Subscription success

- ■ *Enable Log Folder*: Choose wether to enable data saving in Directory **[1]**
- ■ **[1]:** Choose the directory where you want to save your Log files
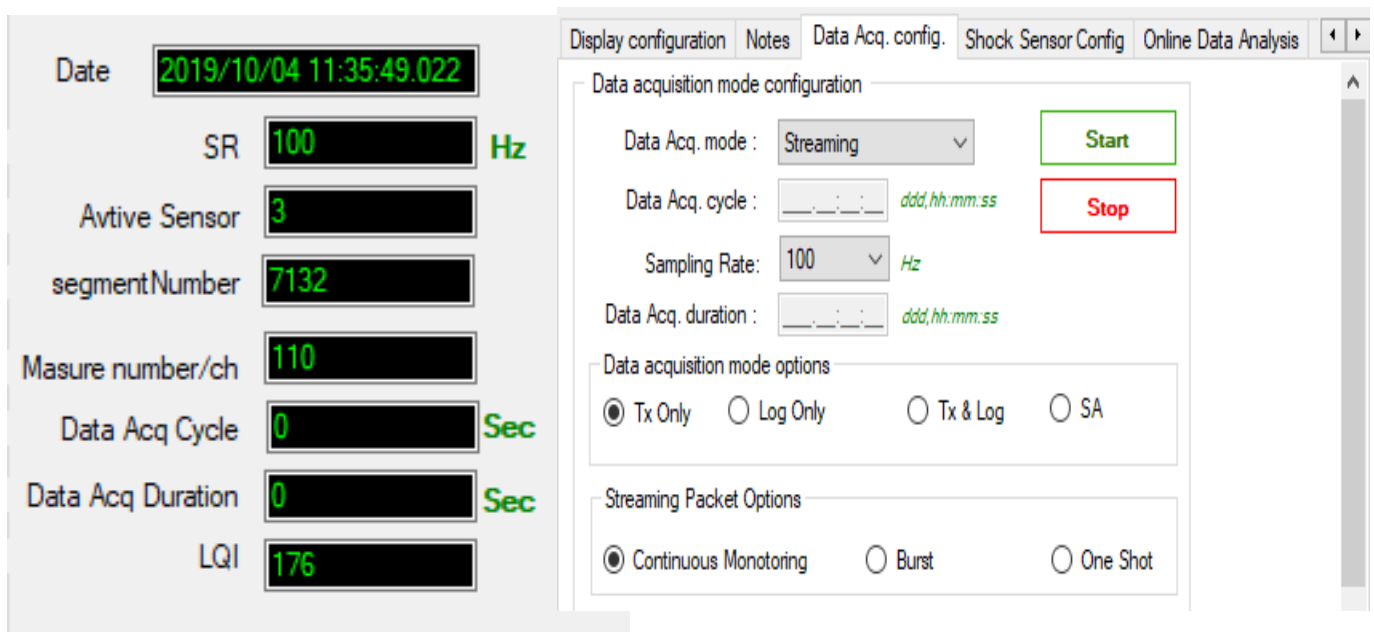

Figure 9 : Configuration Visualization

These are the parameters prefixed in the Beanscape.

- **SR :** Sampling rate frequency

- **Active Sensor:** Number of active channels

- **Segment number :** Number of Segments transmitted

- **Measure number/ch**= 330 / Number of Active sensors

Data acq cycle and Acq duration will be activated when Burst mode is chosen.

Data Acq Duration will be displayed when One shot mode is activayed.

- **LQI :** Signal Quality

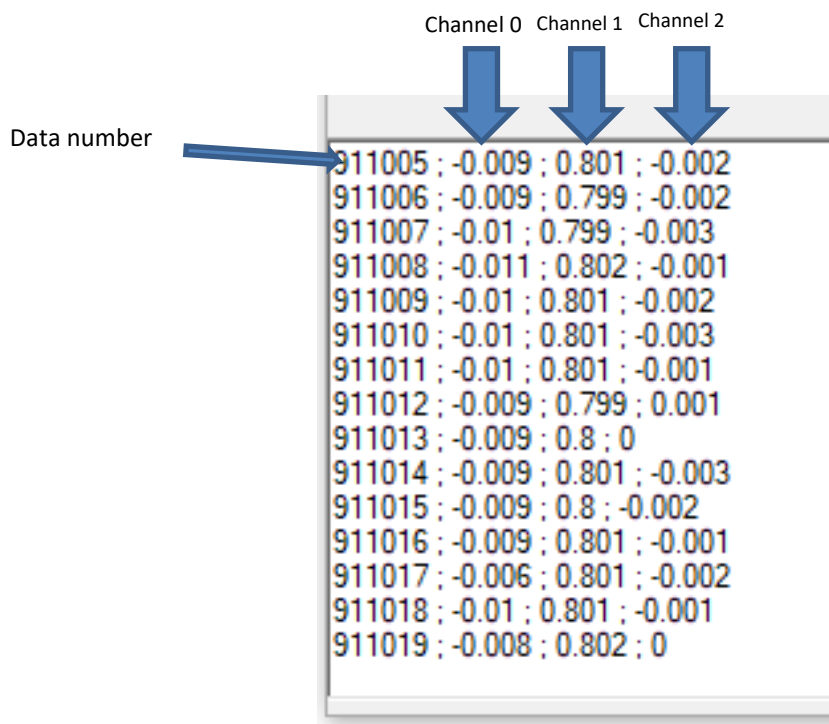2.1.3.4   MQTT toolkit Data acquisition

Figure 10 : Data aquisition

Figure 11 : MQTT toolkit interface

3. RELATED DOCUMENTS & VIDEOS

In addition to this technical note, please consult the related User guide, technical notes and videos:

Document name (Click on the web link)	Related product	Description
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.
UM_RF_007 «UM-RF-07-ENG-Wilow-Wifi-Sensor»	Wilow® products line	BeanDevice® Wilow® user manual

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®

All the videos are available on our YouTube channel