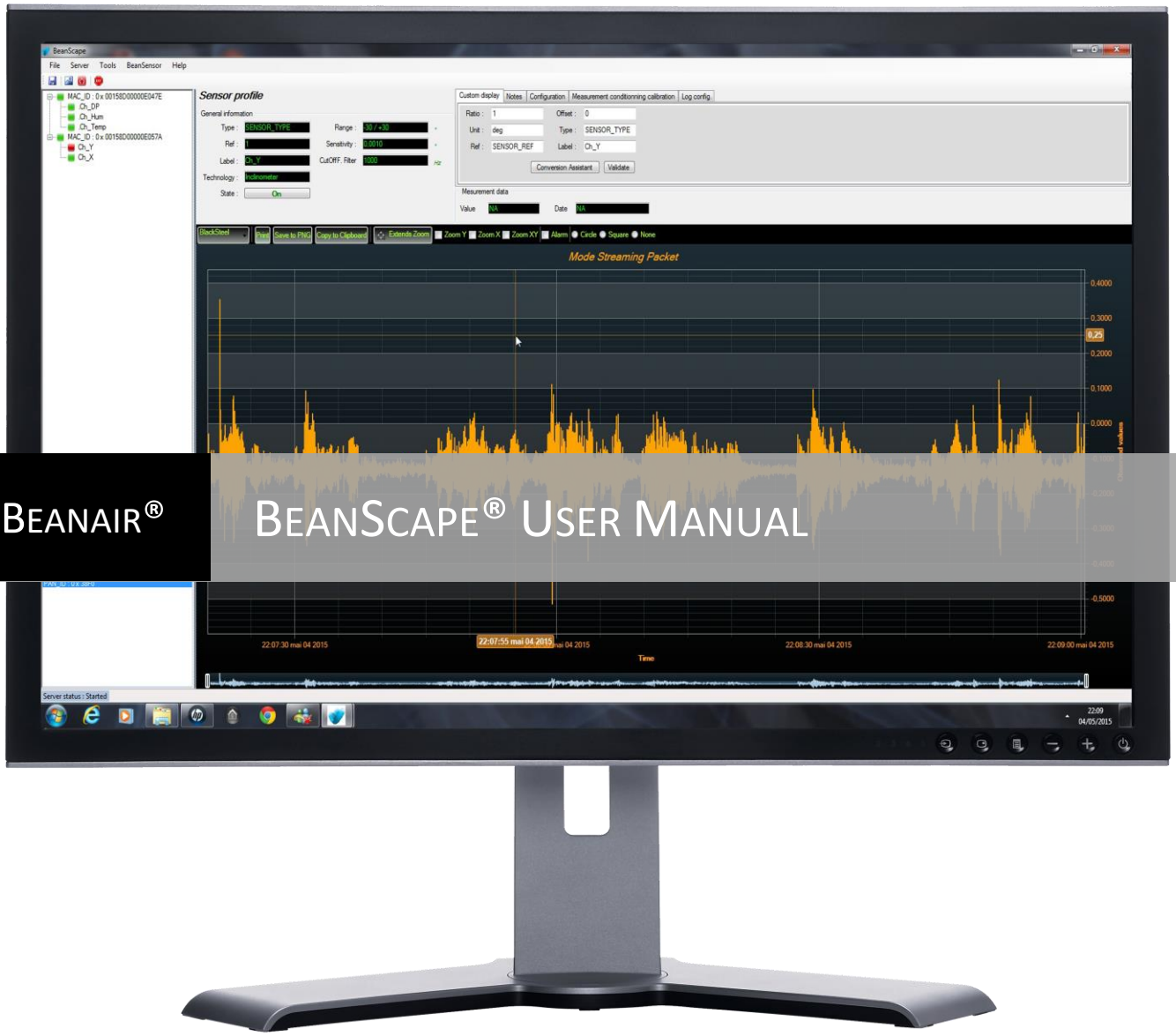
BeanScape®

Version 1.4.1



BEANAIR®

BEANSCAPE® USER MANUAL

BeanAir

Rethinking Sensing Technology

Wilow

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1.0	**12/01/2017**	**Youssef Shahine**	• **First version of BeanScape® willow® document**
1.1	**27/03/2018**	**Aymen Jegham**	• **Updated figures and new features**
1.2	**07/07/2018**	**Youssef Shahine**	• **Data analysis tool moved to BeanDevice® Wilow® User Manual** • **BeanScape® Wilow® RA added**
1.3	**18/08/2018**	**Aymen Jegham**	• **Firewall exceptions added**
1.3.1	**08/05/2019**	**Mohamed Bechir Besbes**	• **Weblinks update**
1.4	**01/04/2020**	**Seddik ATTIG**	• **Screenshots update** • **BeanScape Configuration** • **MQTT Configuration** • **Appendix 3**
1.4.1	**15/11/2021**	**Seddik ATTIG**	• **Links updated**

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Such changes will, nevertheless be incorporated into new editions of this document.

Contents

List of Tables

List of Figures

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

Symbols	*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. 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
LLC	Logical Link Control
LQI	Link quality indicator
LDCDA	Low duty cycle data acquisition
MAC	Media Access Control
PAN	Personal Area Network
PER	Packet error rate
RF	Radio Frequency
SD	Secure Digital
WSN	Wireless sensor Network

4. RELATED DOCUMENTS & VIDEOS

Document name (Click on the web link)	Related product	Description
Data acquisition modes available on the BeanDevice® Wilow®	Wilow® products	Data acquisition modes available on the BeanDevice® Wilow
BeanDevice Wilow battery life in streaming mode	Wilow® products	Wilow wireless sensors battery life in streaming mode
MQTT SPECIFICATION PAPER	Wilow® products	MQTT Communication Protocol for a seamless integration into a third-party IOT software
BUILDING A RELIABLE WIFI NETWORK WITH WILOW® SENSORS	Wilow® products	MQTT Communication Protocol for a seamless integration into a third-party IOT software

In addition to this User manual, please consult the related application notes, technical notes and videos:

4.1 RELATED VIDEOS

All the videos are available on our YouTube channel

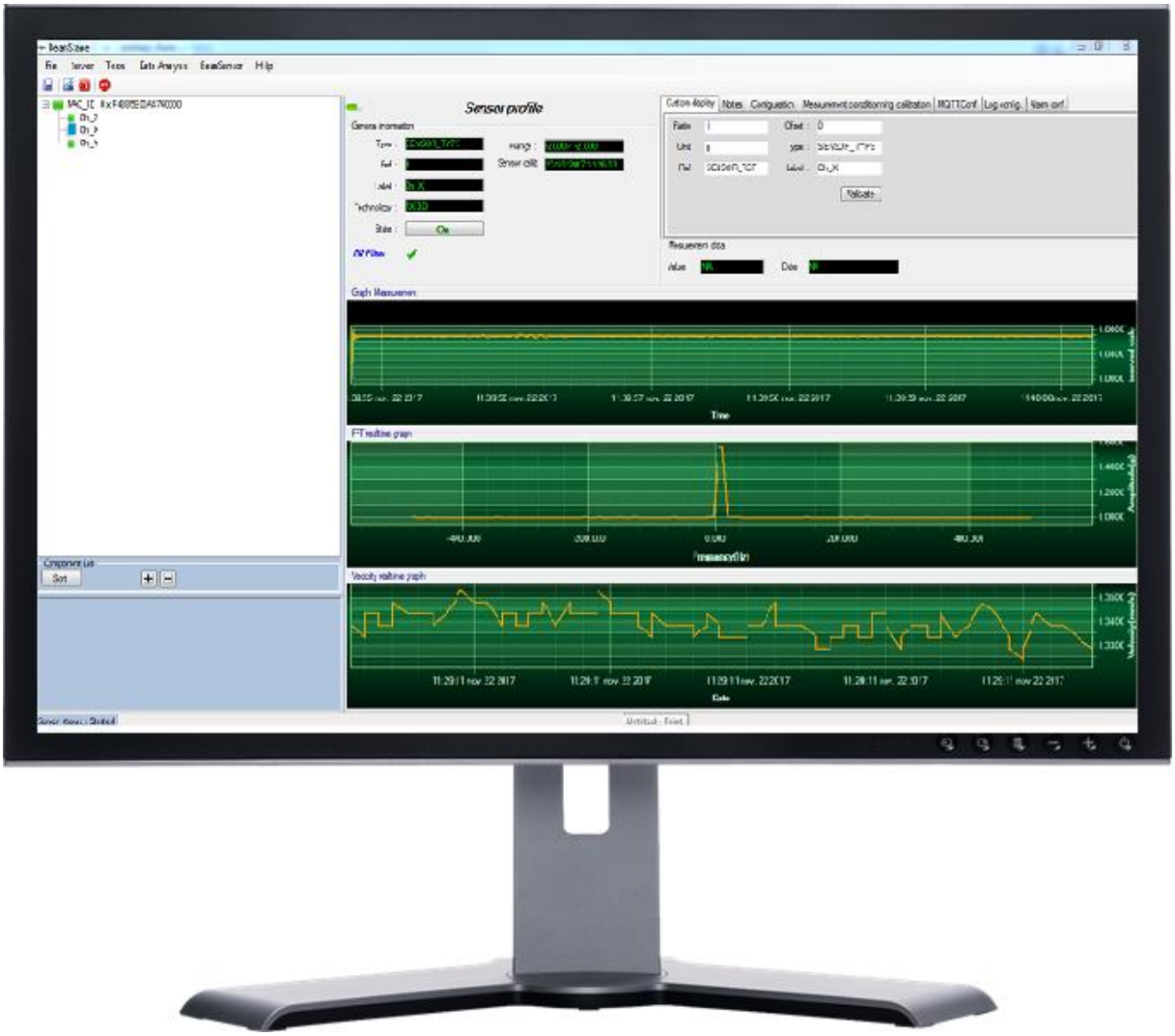
Beanair video link (YouTube)	Related products
Getting started with BeanDevice® Wilow - Wi-Fi Low Power Sensors	Wilow® products
Wilow - Wi-Fi Sensors-Diagnostic cycle on BeanDevice® Wilow	Wilow® products
Wilow - Wi-Fi Sensors-Low duty cycle data acquisition mode on BeanDevice® Wilow	Wilow® products
Wilow - Wi-Fi Sensors-Streaming mode with continuous monitoring on BeanDevice® Wilow	Wilow® products
Wilow - Wi-Fi Sensors-How to setup Wilow Datalogger	Wilow® products
Wilow - Wi-Fi Sensors-Downloading data logs - Wilow IOT sensors	Wilow® products

Wilow - Wi-Fi Sensors- Datalogger memory configuration	Wilow® products
Wilow - Wi-Fi Sensors-NTP Net Time Protocol configuration	Wilow® products
Wilow - Wi-Fi Sensors-Smart Shock Detection (SSD) mode	Wilow® products
Wilow - Wi-Fi Sensors- Log file overview	Wilow® products
Wilow - Wi-Fi Sensors- Power modes	Wilow® products
Wilow - Wi-Fi Sensors-Store & forward+	Wilow® products
Wilow - Wi-Fi Sensors-Stop Button	Wilow® products
Wilow - Wi-Fi Sensors-Alarm Mode	Wilow® products

5. DOCUMENT ORGANIZATION

System Overview	• Quick overview of BeanScape® software
Hardware and software compatibility	•Details Hardware/Software compatibility with different windows OS •Minimum PC configuration
Installing/Uninstalling BeanScape® Wilow® software	• Describes how to install/unisntall your BeanScape® Wilow® software
Start your application	•Describes network configuration, Beandevice® configuration before to start the BeanScape® software and rirewall configuration
Appendices	• Advanced System configuration from BeanScape® software

6. SYSTEM OVERVIEW



BeanScape® Wilow® software is suitable for monitoring and configuring Beanair Wi-Fi sensors. It is designed to provide a high level of flexibility and efficiency.

BeanScape® Wilow® provides the following features:

- ✓ ***Monitoring BeanScape® Wilow® Wi-Fi sensors.***
- ✓ ***Displaying configured alarms of different Wi-Fi sensors.***
- ✓ ***Sensors calibration and configuration***
- ✓ ***OTAC (Over-the-air-configuration)***
- ✓ ***Data and diagnosis analysis through curves and statistics***
- ✓ ***Ability to store measurements and diagnostic information in a database as a LOG file***
- ✓ ***Tools for optimizing the installation of Wi-Fi sensors***

The BeanScape® Wilow® is a powerful software tool with client/server architecture. This implies that the network sensor communicates with the BeanScape® Wilow® through Wi-Fi. The BeanScape® acts as the server and the BeanDevice® Wilow® acts as the client.

Beanair ® Wi-Fi network is comprised of Wi-Fi sensors (BeanDevice® Wilow®) and Wi-Fi Router, access point, repeater or Hotspot.

Features	BeanScape Wilow MANAGER	BeanScape Wilow LITE	BeanScape Wilow BASIC	BeanScape Wilow PREMIUM	BeanScape Wilow R.A.Version
Period technical assistance	6 months	6 months	1 year	1 year	1 year
Free of cost ?	Yes	Yes	No	No	No
Number of managed Beandevice® Wilow	35	5	35	unlimited	unlimited
Real-time graph display	No	Yes	Yes	Yes	Yes
Alarm notification by email. System and Data Acquisition alarms	No	No	Yes	Yes	Yes
Streaming with Event-Trigger (S.E.T.) mode	No	Yes	Yes	Yes	Yes
Real-Time FFT, Real-Time Velocity	No	No	No	Yes	Yes
Automatic reports by email (Waveform, FFT, PPV, Particle Velocity)	No	No	Only Waveform report	Yes	Yes
Remote access (based on MQTT Architecture)	No	No	No	No	Yes
Integrated MQTT Broker	No	No	No	No	Yes
MQTT full services (Diagnostics, Measurement and remote configuration)	Yes	Yes	Yes	Yes	Yes

Figure 1 : the different versions of BeanScape® Wilow® software

BeanScape® Wilow® manager is not provided with a real-time graph display.

7. HARDWARE & SOFTWARE COMPATIBILITY

7.1 COMPATIBLE OPERATING SYSTEMS

The BeanScape® Wilow® is compatible with many operating systems:

Operating Systems	*Compatibility*	*Tested/Certified*
Windows XP	*Yes*	*Yes*
Windows Vista	*Yes*	*Yes*
Windows 7 (32-bit)	*Yes*	*Yes*
Windows 7 (64-bit)	*Yes*	*Yes*
Windows 8 (32-bit/64-bit)	*Yes*	*Yes*
Windows 8.1 (32-bit/64-bit)	*Yes*	*Yes*
Windows 10(32-bit/64-bit)	*yes*	*yes*

Table 1: Compatible operating systems

7.2 RECOMMENDED MINIMUM CONFIGURATION

Operating Systems	*BeanScape® Wilow® Manager (Streaming mode not enabled)*	*BeanScape® Wilow® (Streaming mode not enabled)*	*BeanScape® Wilow® (Streaming mode enabled)*
CPU	*2.33GHz or faster x86-compatible processor*		
RAM memory	*1 GB*	*2 GB*	*4 GB*
Disk Space	*5 GB*	*5 GB*	*10 GB*
Graphic card	*128 MB*	*128 MB*	*1 GB*

Figure 2:Table 2: Recommended minimum configuration

8. INSTALLING/UNINSTALLING BEANSCAPE® WILOW® SOFTWARE

8.1 INSTALLING YOUR BEANSCAPE® WILOW®

Installing the BeanScape® Wilow® software is very easy:

- ✓ Double click on “setup.exe” file (shown below) to launch BeanScape®

- ✓ Follow the different stages of installation
- ✓ When installing the software, a location for the log files is requested. These files are used to store all the data coming from the Wireless Sensor Network (information about the Network diagnostic, data acquisition of different wireless sensors, network acknowledgment etc.).
- ✓ Click Finish to complete the installation of **BeanScape® Wilow®.**
- ✓ The installation is now complete; the **BeanScape® Wilow®** shortcut icon is now available on your desktop.

8.2 UNINSTALLING BEANSCAPE® WILOW®

To uninstall BeanScape® Wilow®, follow these instructions:

1. Click 
2. Then search for control panel

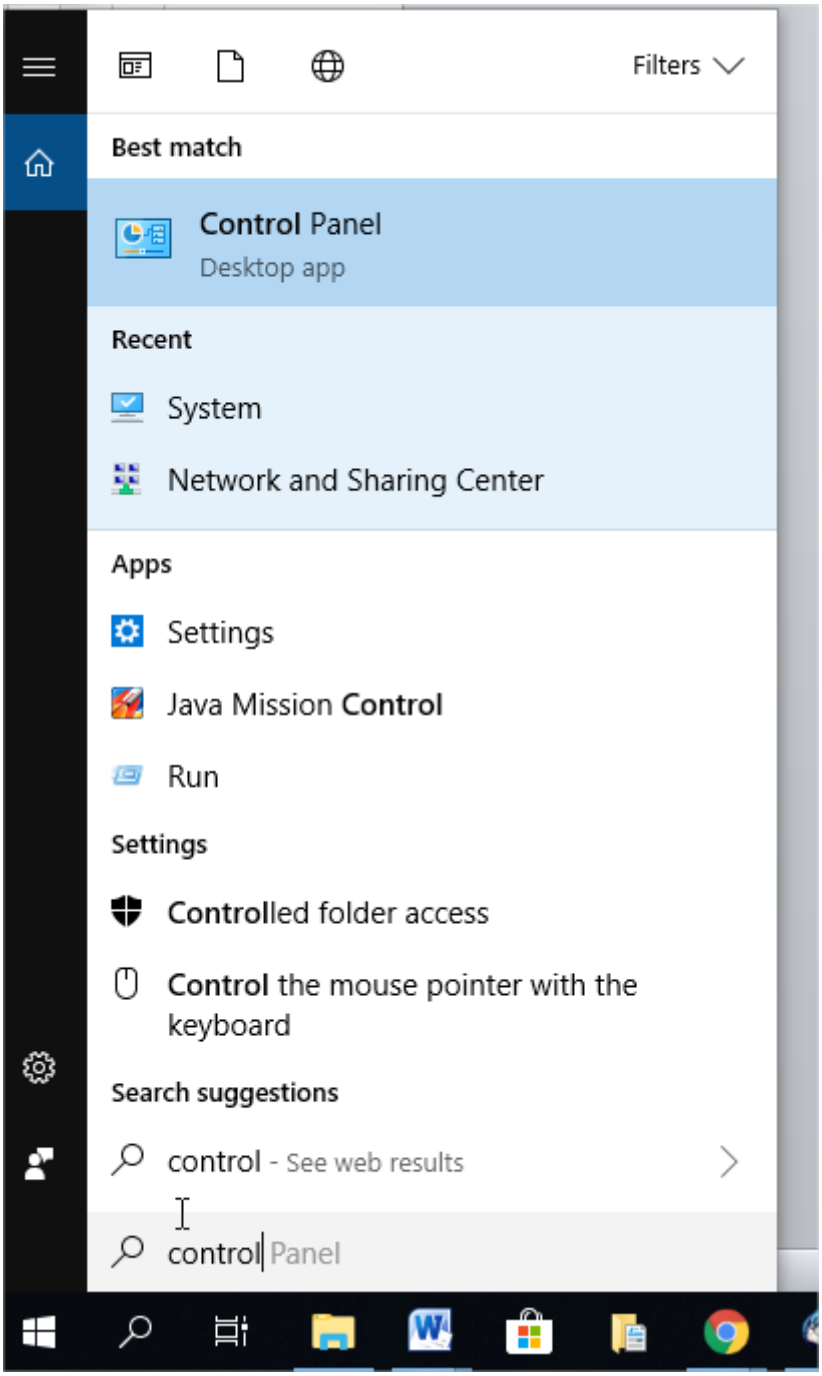
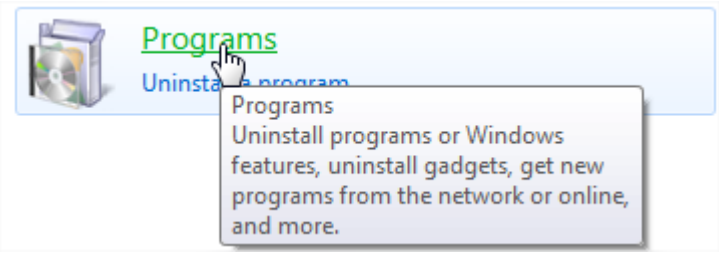


Figure 3:research Menu

3. Double click on uninstall a program under the Programs icon



4. You will see the following window:

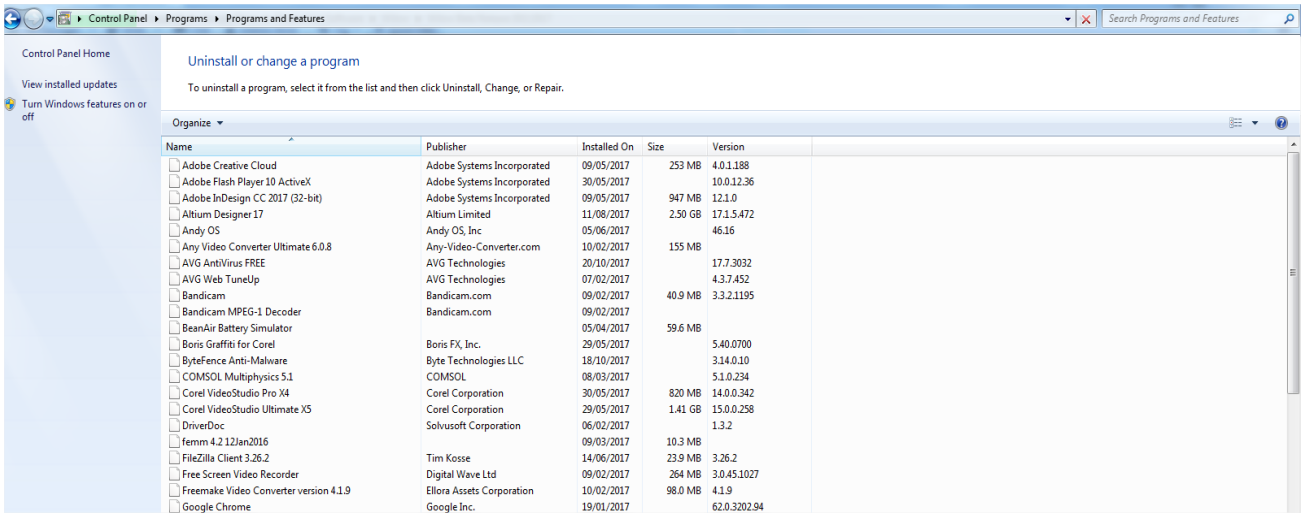


Figure 4: control panel

5. Select BeanScape® Wilow® and click 

6. Follow the steps for uninstalling.
7. Uninstall is now complete.

9. START YOUR APPLICATION

9.1 NETWORK CONFIGURATION

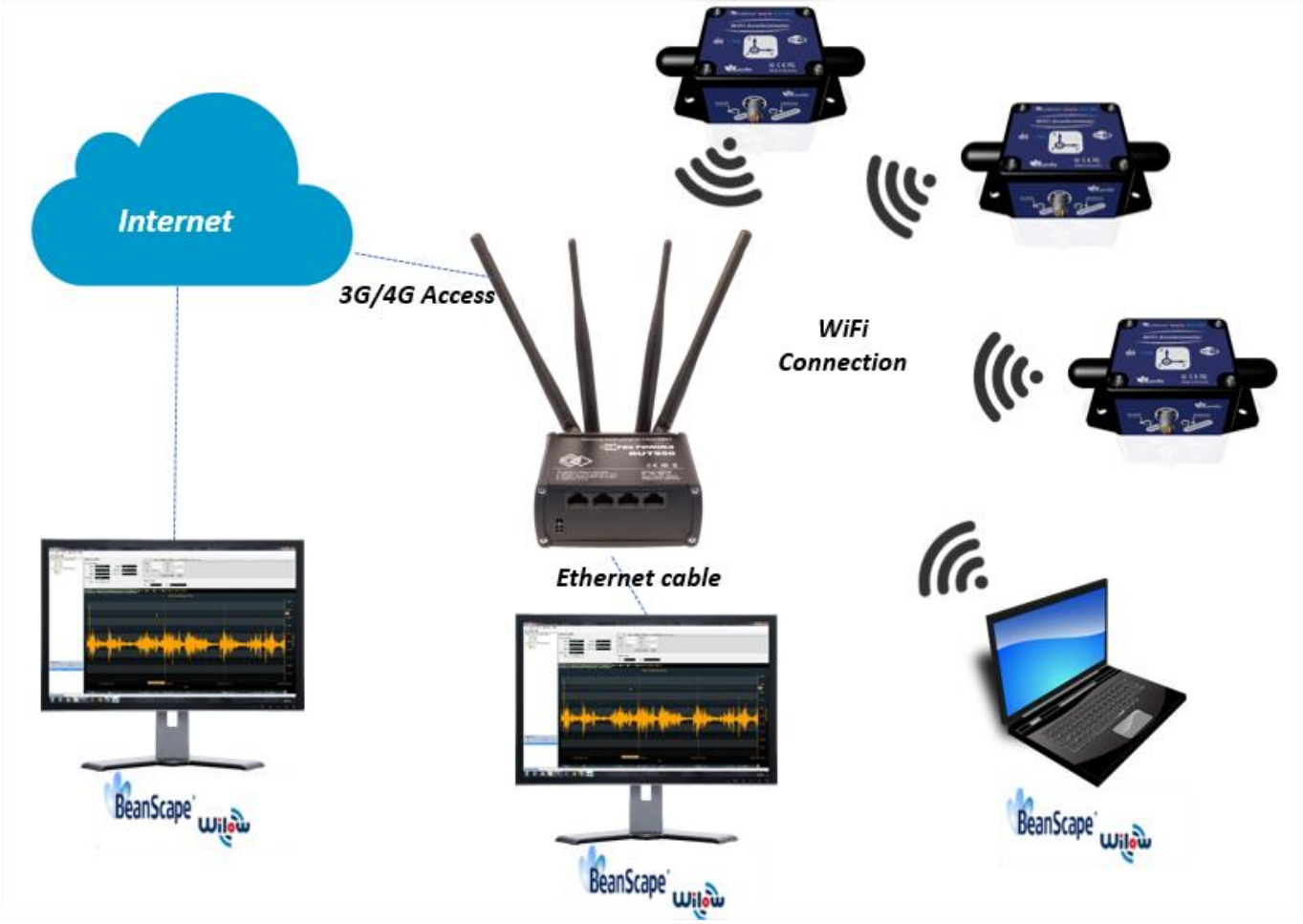


Figure 5: Typical BeanDevice® Wilow® Wi-Fi Network

BeanDevice® Wilow® is Wi-Fi powered sensor that will communicate measurements and receive configuration commands through Wi-Fi signal.

After installing BeanScape® Wilow® supervision software we can start configuring our sensor connecting them to the Wireless network.

Different other network configurations are possible, please visit our:

Technical note: building a reliable Wi-Fi network with Wilow sensors ,

User Manual: BEANDEVICE® WILOW® (WIFI LOW POWER) USER GUIDE

9.2 BEANDEVICE® WILOW® CONFIGURATION

Before to connect the **BeanDevice® Wilow®** to the Wi-Fi network we have to follow the next steps:

1. Launch your ***BeanScape® Wilow®*** as administrator
2. Power your ***BeanDevice® Wilow*** by holding the magnet on the ON/OFF label, you will see the Network led blinking in green color
3. Select Tools on the BeanScape menu and choose "**LAN/WAN Config**"

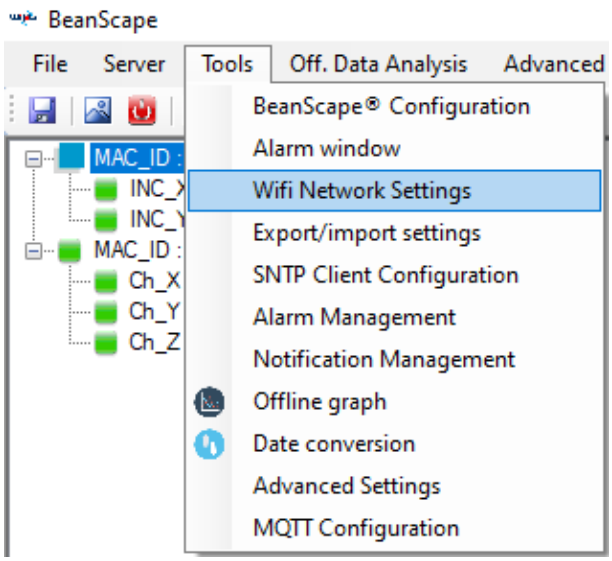


Figure 6: WIFI Network Settings

4. The following window will pop up:

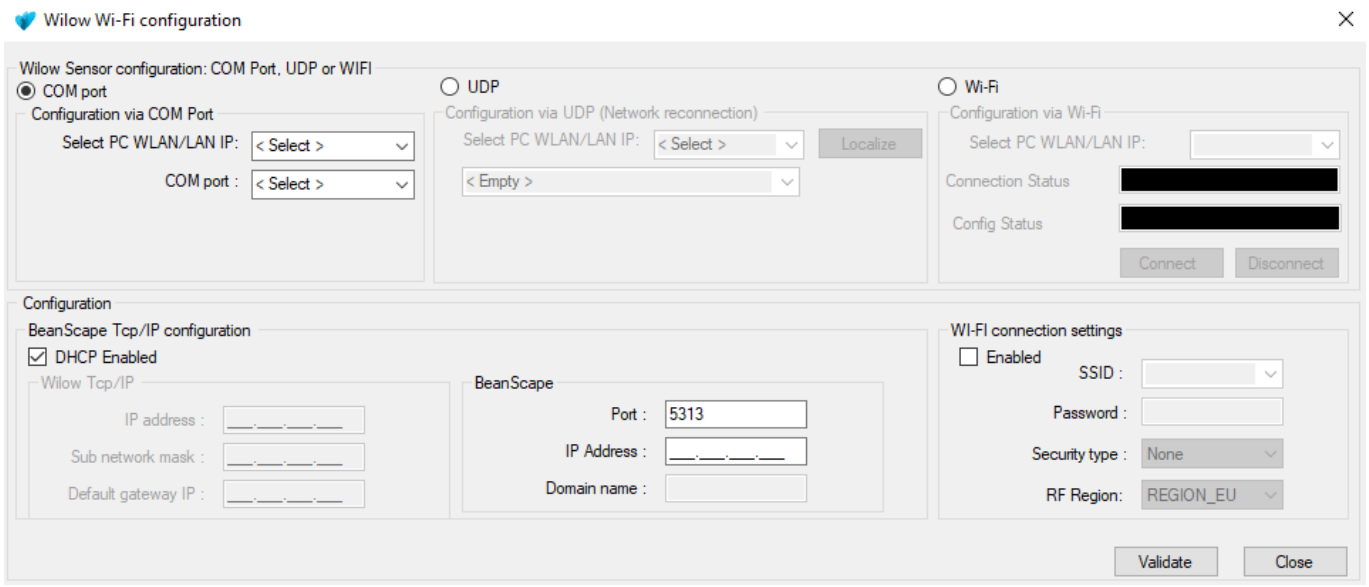


Figure 7: WIFI Configuration Settings

5. On LAN/WLAN Config select your PC IP Address sharing the same WIFI Hotspot/Access Point which will be connected to your BeanDevice® Wilow®

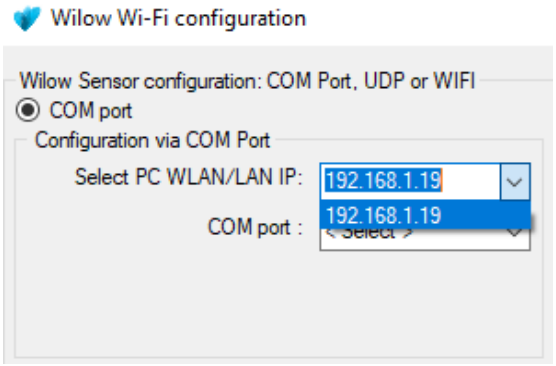


Figure 8: port com configuration

6. After selecting the right IP Address, the field "TCP/IP configuration is automatically filled out

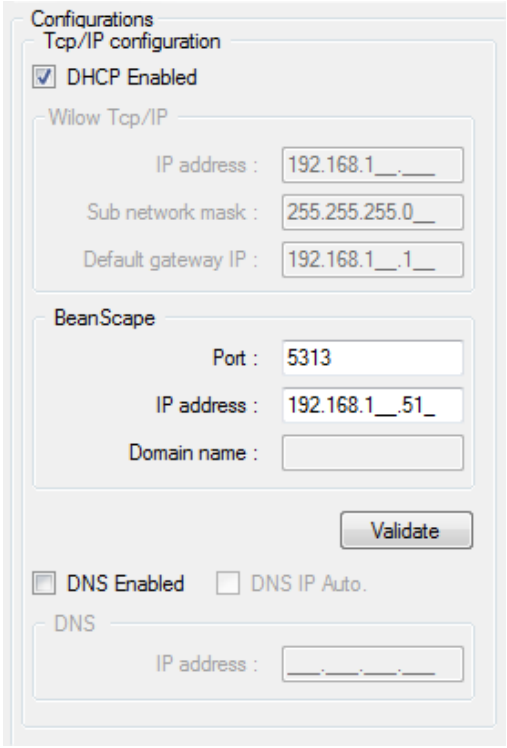


Figure 9: TCP/IP Configuration

7. Click on serial port and select the serial port number connected to your BeanDevice® WiLow®

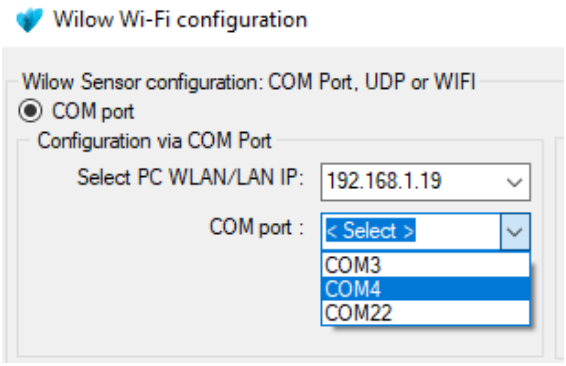


Figure 10: Available port COM

8. Enter your BeanDevice® WiLow® IP address : if you choose a dynamic IP allocation, check DHCP box:

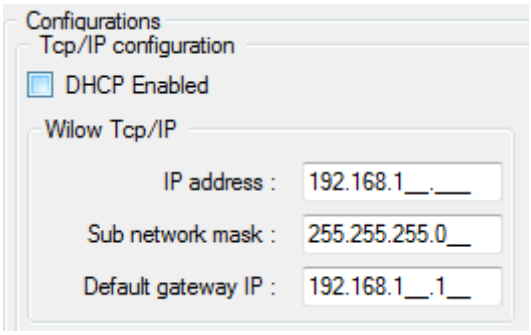


Figure 11: DHCP option

9. Enter your WIFI Hotspot/Access Point Network configuration which will be connected to your BeanDevice® WiLow® (SSID, password and security type/RF Region) of your Wi-Fi connection

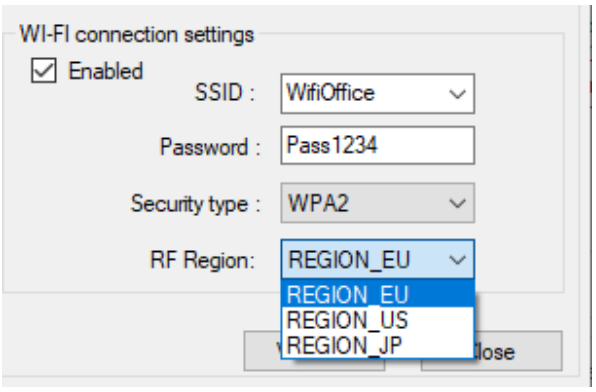


Figure 12: WIFI connection Settings

By default, the BeanDevice® WiLow® Wi-Fi configuration settings are:

SSID: _lobalnet

Password: changeme

Security type: wpa2

Finally, click on Validate, you should see a pop-up window which will display "Operation completed successfully".

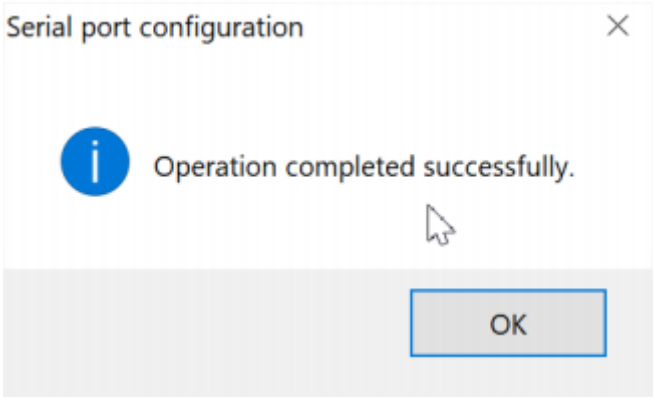


Figure 13: Notification message

10. Then click on Start to launch your **BeanScape® *Wilow®*** supervision software

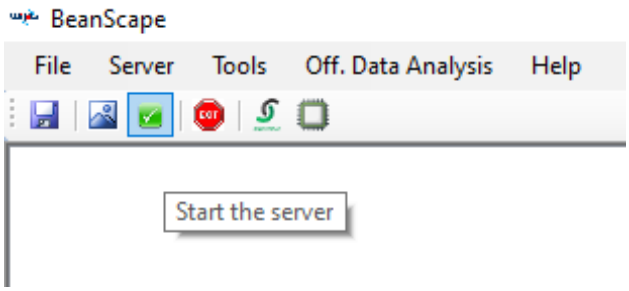


Figure 14: BeanScape Server Icon

Now you will see your ***BeanDevice® Wilow®*** *profile displayed as follow:*

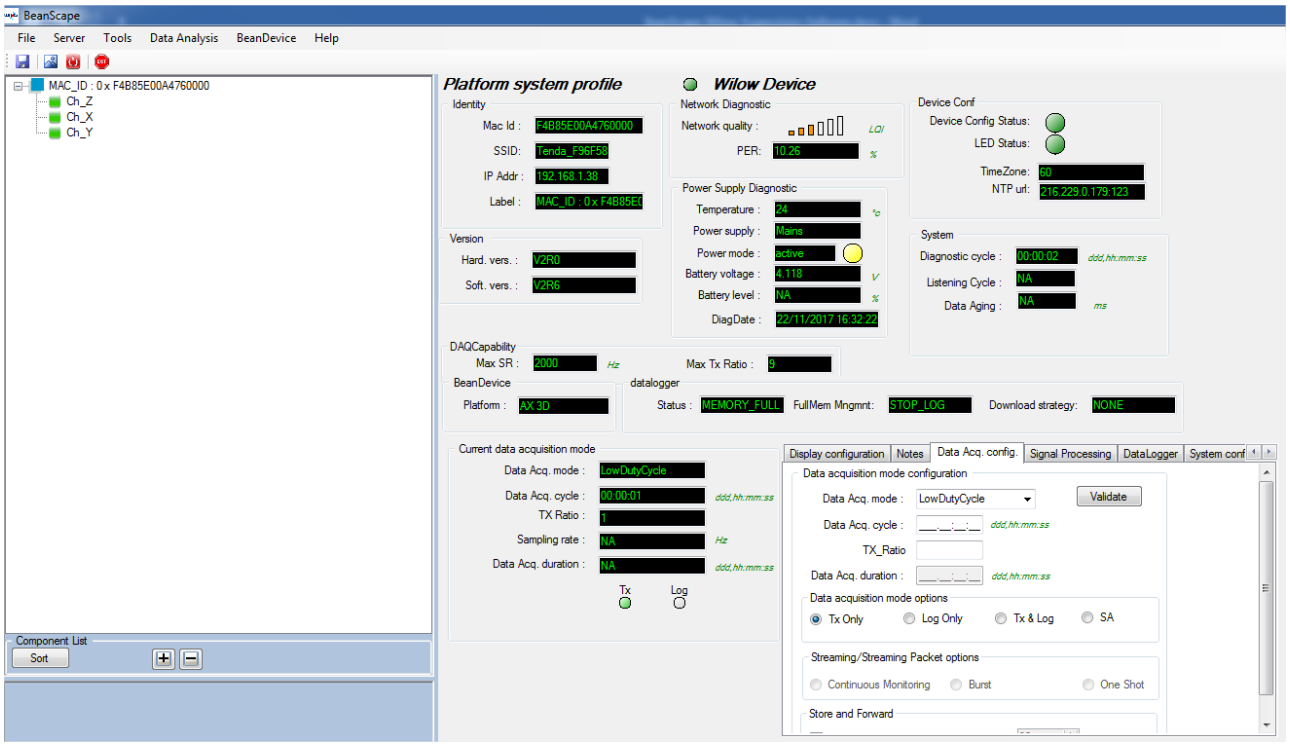


Figure 15: BeanDevice® profile

See our Technical video Getting started with BeanDevice® Wilow

You only need to do this once unless you have changed your Wi-Fi SSID or want to install your BeanDevice Wilow in another network

Now after configuring all of the sensors you can view the entire Wi-Fi sensor network from your ***BeanScape® Wilow®***

- ✓ Make sure all of your sensors are covered by your Wi-Fi signal**.**
- ✓ Make sure your all of your sensors are powered and in "ON" position.
- ✓ Make sure that your ***BeanScape® Wilow®*** is installed and running on your PC

- Select your PC IP Address connected to your Wi-Fi network and click on localize

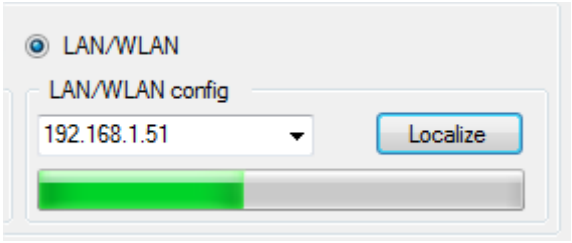


Figure 16: BeanDevice® localization

- After localization finished ,all the sensors connected to the network will show up

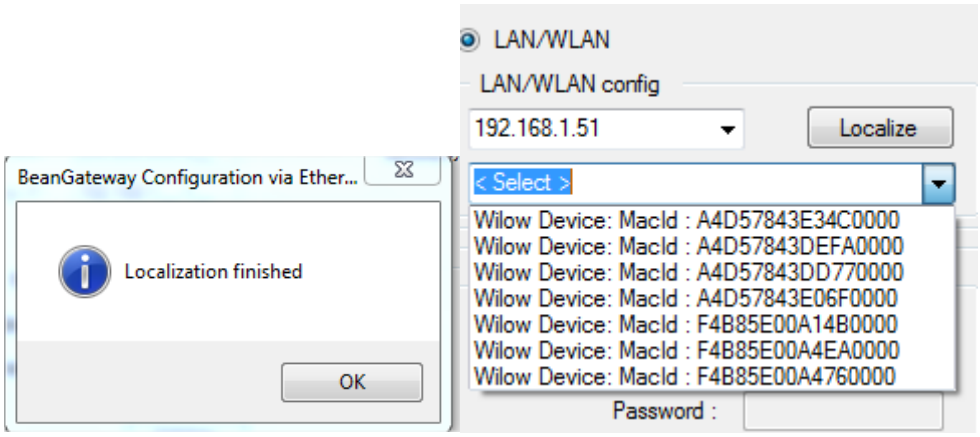


Figure 17:Available BeanDevice on the network

9.3 FIREWALL COMPATIBILITY

Some firewalls will not permit applications such as BeanScape® Wilow® (or any applications you have not specifically allowed) to share data with your BeanDevice® Wilow® . Generally, the first time the

BeanScape® Wilow® tries to communicate with the BeanDevice® Wilow®, you will be asked if you would like to allow that application access. If you accidentally clicked **No** on that message (or if your firewall never asked for permission to allow the BeanScape® Wilow® access), you will not be able to use the **BeanScape® Wilow®** until you configure your firewall to allow BeanScape® Wilow® to have network activities.

With most firewalls, this is easy to do. Keep in mind that all firewalls are a bit different, but the process is usually as follows:

1. Make sure that your **BeanScape® Wilow®** is not running
2. Open your firewall. If you cannot find your firewall application, check the System Tray (at the bottom-right corner of the screen) for an icon. Usually, you can right-click this icon and select to open the firewall
3. Your firewall maintains a list of applications installed on your computer (usually under a heading like Settings or Program Control). In this list, locate the entry for BeanScape® Wilow®
4. Configure the BeanScape® Wilow® entry to allow it to communicate with your sensors.
5. Save your modifications.
6. Restart the BeanScape® Wilow® supervision software

9.4 START THE BEANSCAPE® WILOW®

To start BeanScape ® Wilow®, please follow the instructions:

- Start BeanScape® Wilow® by double-clicking the icon

- You get the following screen:

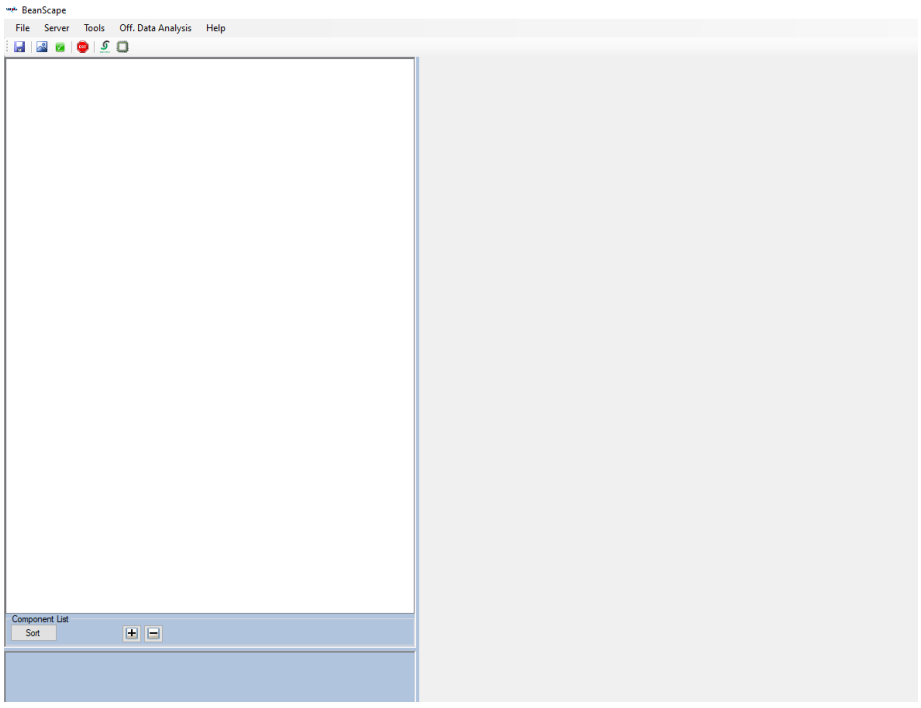


Figure 18:BeanScape® first look

- Start the server by clicking the Start button

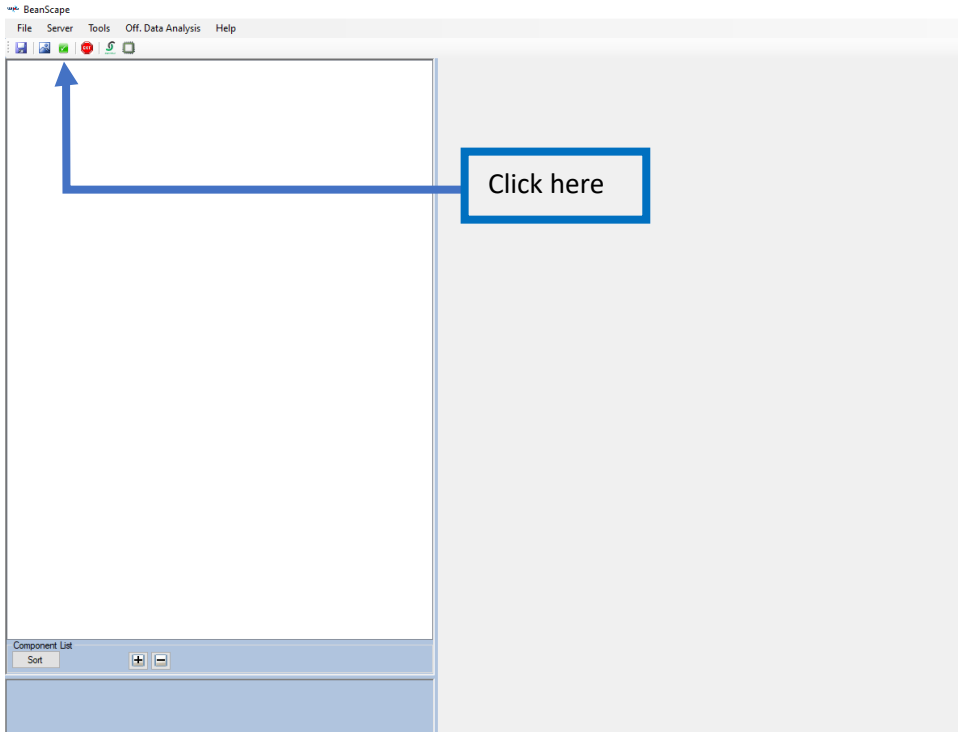


Figure 19: start the server

The BeanScape® Wilow®, server starts, and creates the BeanDevice® Wilow®, mapping based.

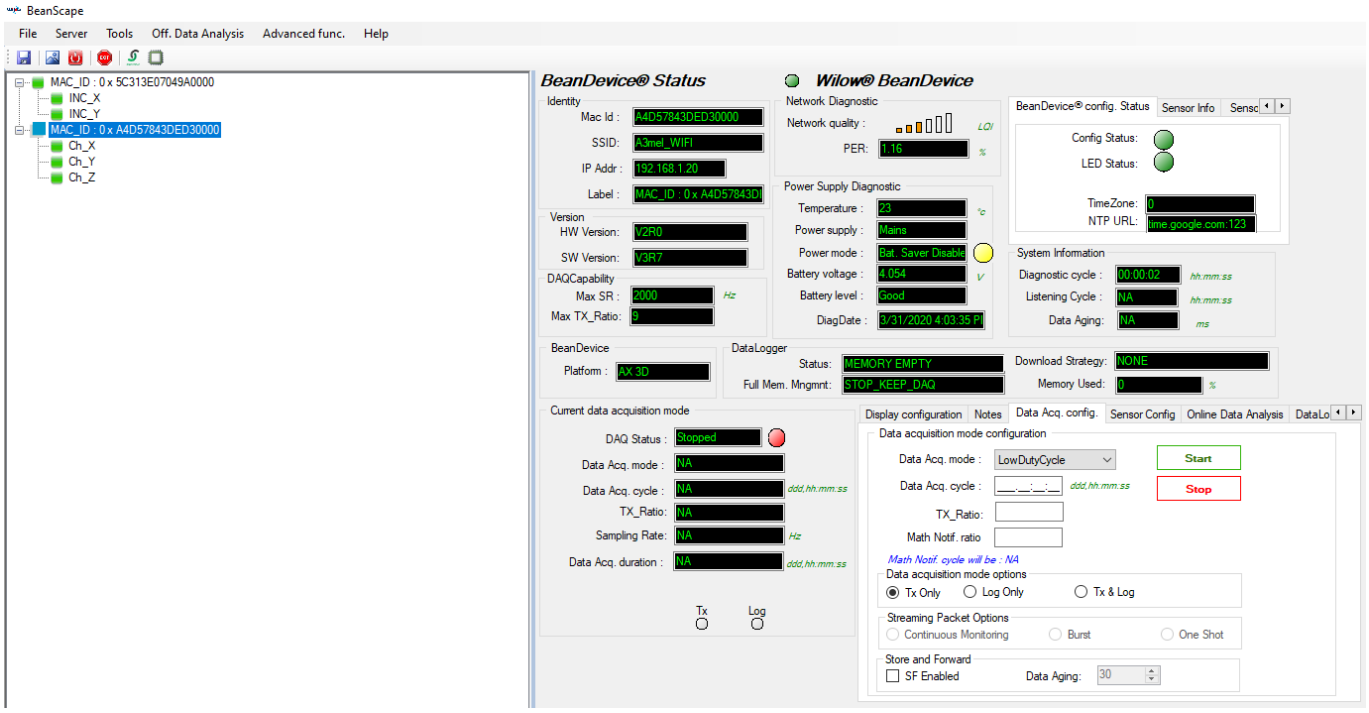


Figure 20: BeanDevice® profile

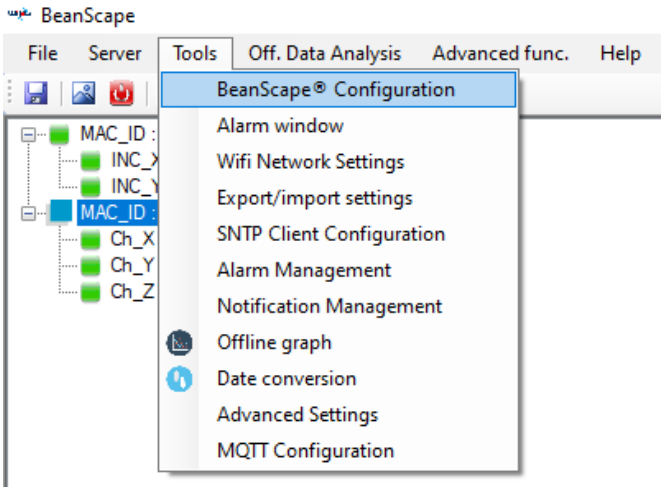
10. APPENDICES

10.1 APPENDIX 1: ADVANCED SYSTEM CONFIGURATION

10.1.1 Options

The following procedure applies only for advanced users

Click on the tab **Tools** then **BeanScape® Configuration** to configure advanced settings in ***BeanScape® Wilow®***:



This window lets you configure the log directory, data cache, language, etc.

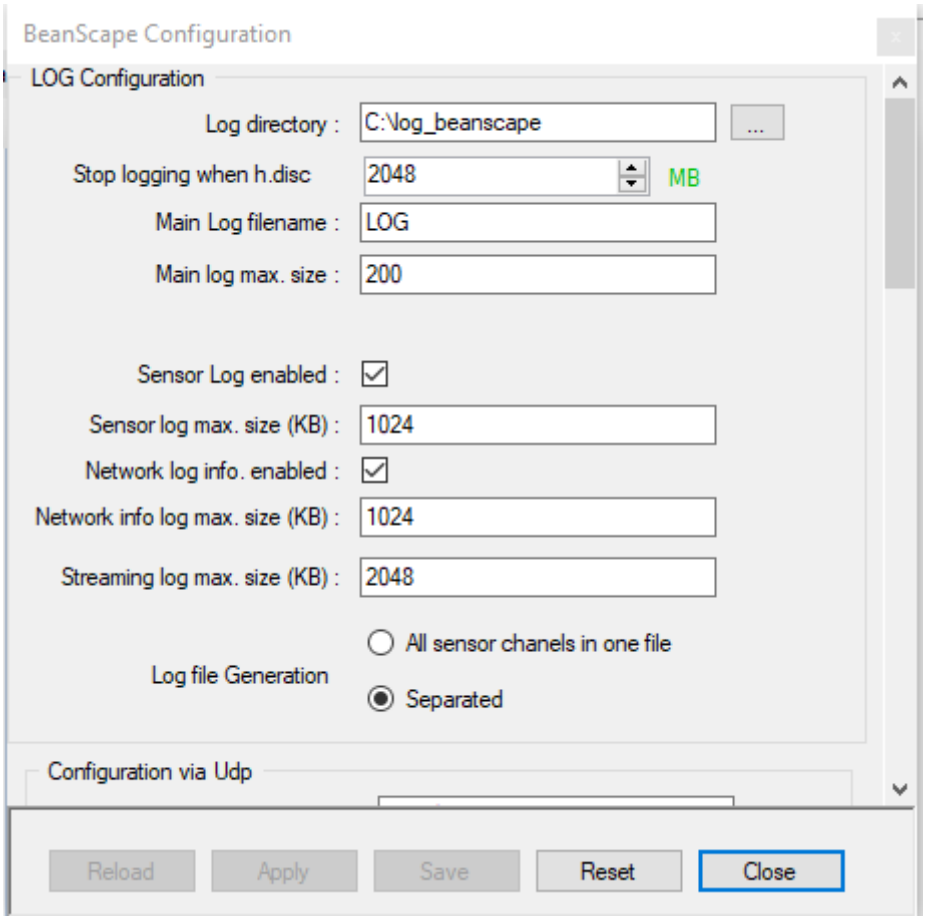
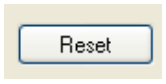


Figure 21: BeanScape® Configuration window

✓ Clicking the button 

reverts to its original configuration.

10.1.2 Log file size configuration

- **LOG directory**: Enter here the path/folder where you would want to save the LOG files.
- **Main log filename:** Here you may enter the desired name in order to save the LOG file.
- **Main log max. size (KB):** Maximum file size in Kilobytes (KB) for your principal LOG file
- **Sensor Log Enabled:** Check this box if you want to enable the sensor(s) data acquisition in your LOG file
- **Sensor log max. size (KB) :** Maximum size in Kilobytes (KB) of sensor log files (except for streaming & streaming packet data acquisition mode)
- **Network log info. enabled:** Check this box if you want to enable network information in your LOG file

- **Network info log max. size (KB):** Maximum size in Kilobytes for your network information LOG file
- **Streaming log max. size:** Maximum size in Kilobytes (KB) of sensor log files (only for streaming & streaming packet data acquisition mode)

10.1.2.1 Log file generation

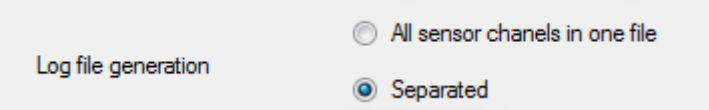


Figure 22:Log file generation options

By default, one log file is linked to one sensor channel. The user can select a log file linked to the entire sensor channels present on the BeanDevice® Wilow®.

10.1.2.2 Data cache configuration

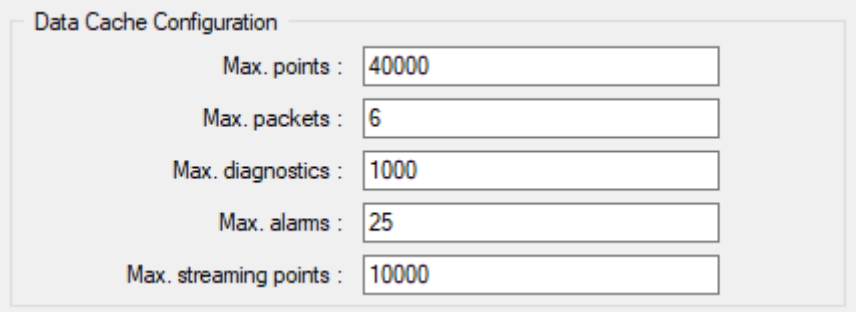


Figure 23: Data cache configuration

- **Maximum number of points**: Set here the maximum number of points displayed on the BeanScape® Wilow® graph
- **Maximum number of packets**: Set here the maximum number of packets displayed on the BeanScape® Wilow® graph
- **Max number of diagnostics**: Set here the maximum number of diagnostics displayed on the BeanScape® Wilow® graph
- **Max number of alarms**: Set here the maximum number of alarms displayed on the BeanScape Wilow® graph
- **Maximum streaming points**: Set here the maximum number of points displayed in Streaming/Streaming Packet on the BeanScape® Wilow® graph

Please note that the values backed up by the BeanScape® may affect the memory capacity of your computer depending upon the size of every file.

10.1.2.3 UDP Configuration

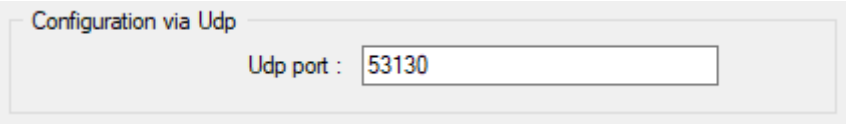


Figure 24: UDP Port

Configure the UDP port number, by default to 5313 in order to listen.

10.1.2.4 Keep alive application

Figure 25: Keep alive configuration

Three parameters related to Keepalive are available:

- **Keepalive time** is the duration between two keepalive transmissions in idle condition. TCP keepalive period is required to be configurable and by default is set to no less than 2 hours.
- **Keepalive interval** is the duration between two successive keepalive retransmissions, if acknowledgement to the previous keepalive transmission is not received.
- **Keepalive retry** is the number of retransmissions to be carried out before declaring that remote end is not available.

Keep alive packet contains null data. In a TCP/IP over Ethernet network, a keepalive frame is of 60 bytes, while acknowledge to this also null data frame and is of 54 bytes.

10.1.2.5 Language configuration

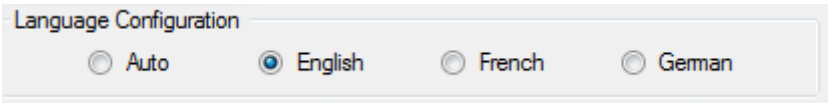


Figure 26: Language configuration

- ***Auto***: The BeanScape® Wilow® will use the OS language by default
- ***English***: select English language
- ***French***: select French language
- ***German***: select German language

This configuration will be updated if the BeanScape® is restarted.

10.1.2.6 System Configuration

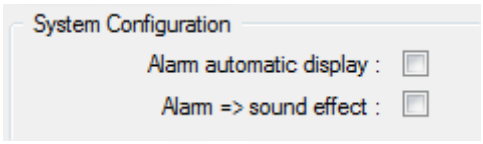


Figure 27: System Configuration

- ***Alarm automatic display***: Check this box if you want to see an alarm window displayed automatically when a window alarm threshold is exceeded.
- ***Alarm ➔ Sound Effect***: Check this box if you want to hear a sound effect when a threshold is exceeded.

10.1.2.7 Remote Access

Check Enable MQTT option for remote access configuration.

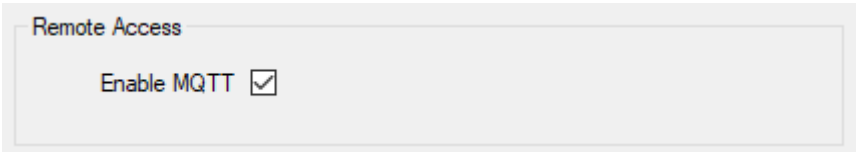


Figure 28: Remote Access

10.1.2.8 Date and Time Format

Several date and time format options are available, choose the one that suit your needs.

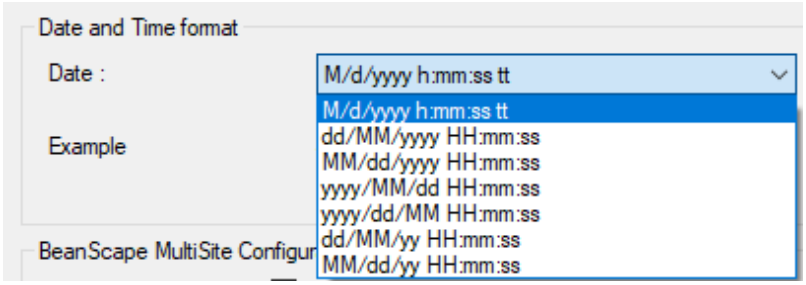


Figure 29: Date and Time Format

10.1.2.9 BeanScape® MultiSite Configuration

User have the possibility to open more than one BeanScape® session at the same time on the same PC.

Just check the box to enable the option.

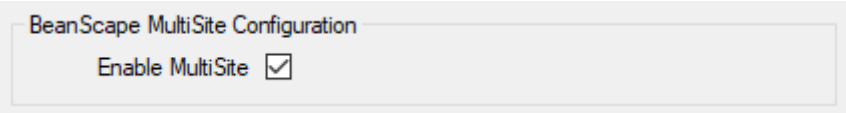


Figure 30: BeanScape® Multisite configuration

10.1.2.10 Gravity Config

The gravity value is not the same on different region area, this option gives user the possibility to enter the exact g value.

Figure 31: Gravity Config

10.1.3 Custom user configuration

10.1.3.1 Export function

Click on the tab ***Tools*** then "***Export/Import settings***"

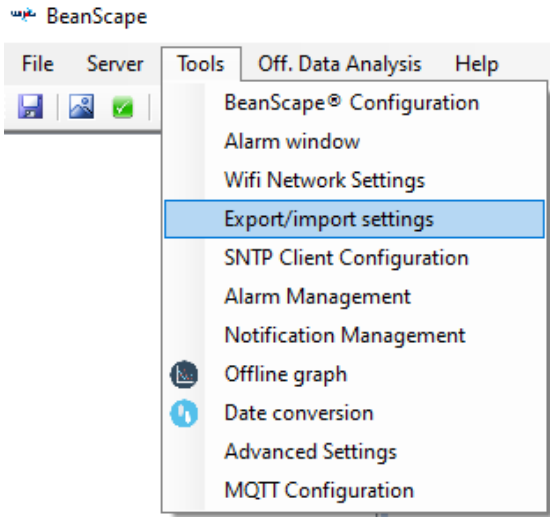


Figure 32: Export/Import Settings

A new window will appear, click on ***export***:

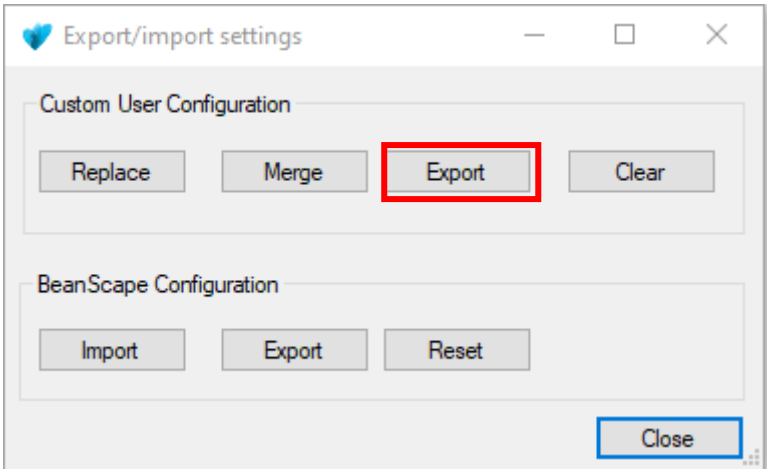


Figure 33: Export function

User configuration is exported in XML format:

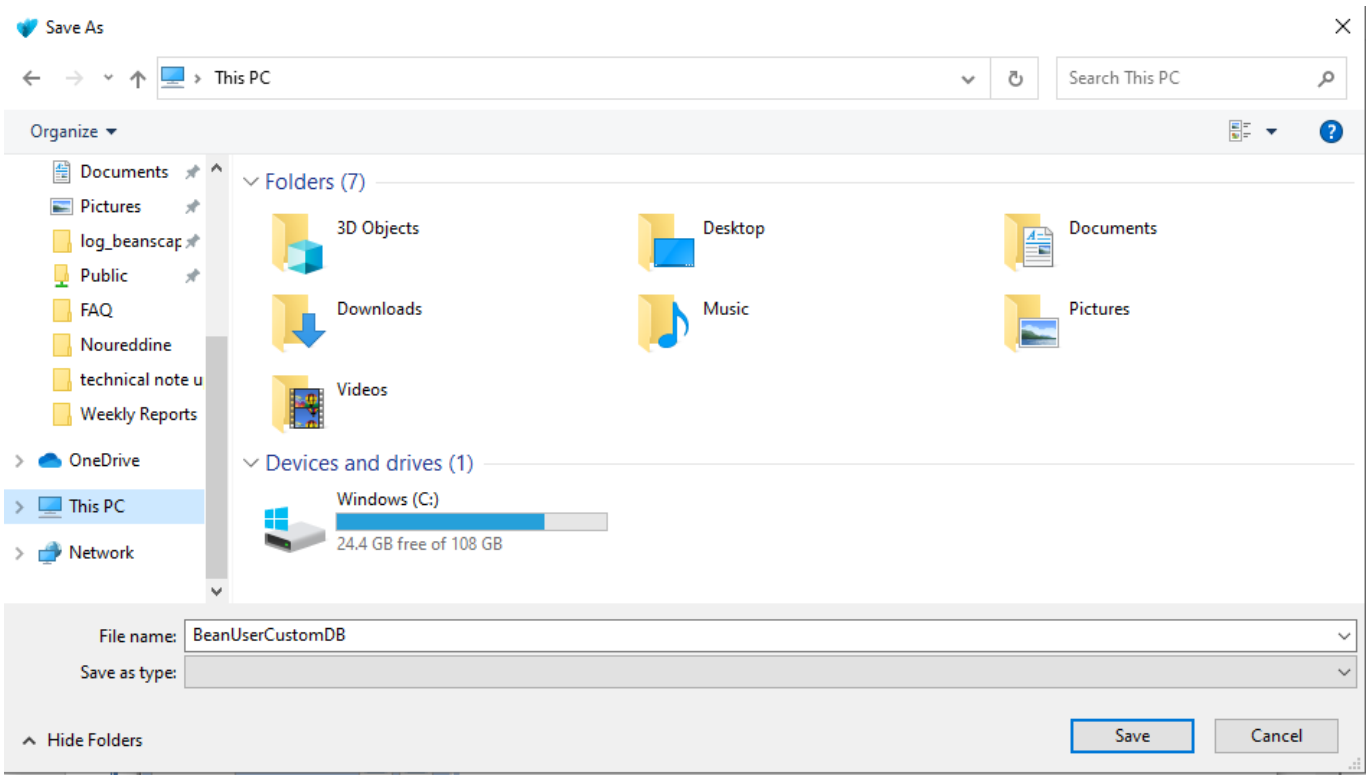


Figure 34: User DataBase file

10.1.3.2 Import function

Click on "***Replace***" to import user configuration:

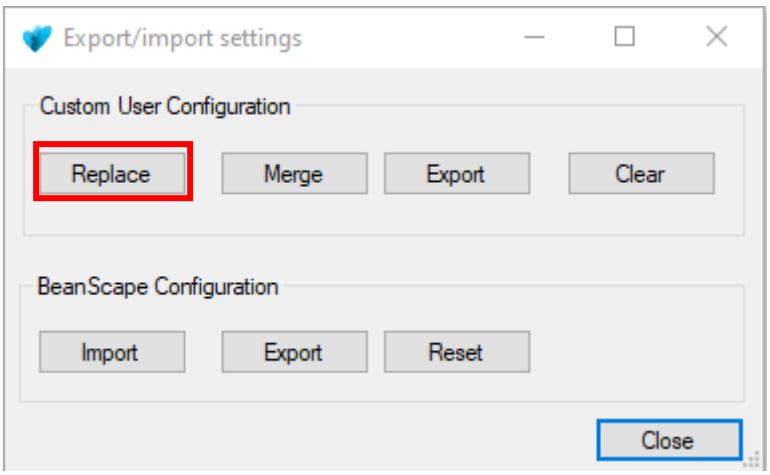


Figure 35: Replace function

Do not try to change manually the XML file; there is a high risk to corrupt your file.

10.2 MQTT CONFIGURATION

After configuring the MQTT on the BeanDevice® side, user need to complete the configuration on the BeanScape® side, to do that go to Tools/MQTT Configuration

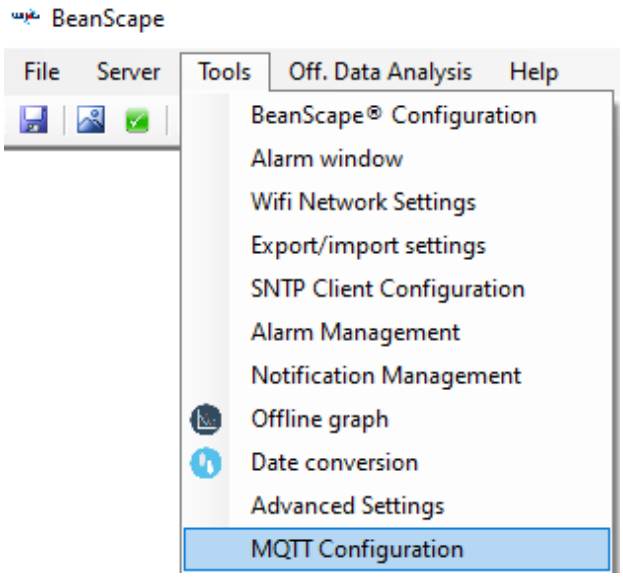


Figure 36: MQTT Configuration

A new message will pop up

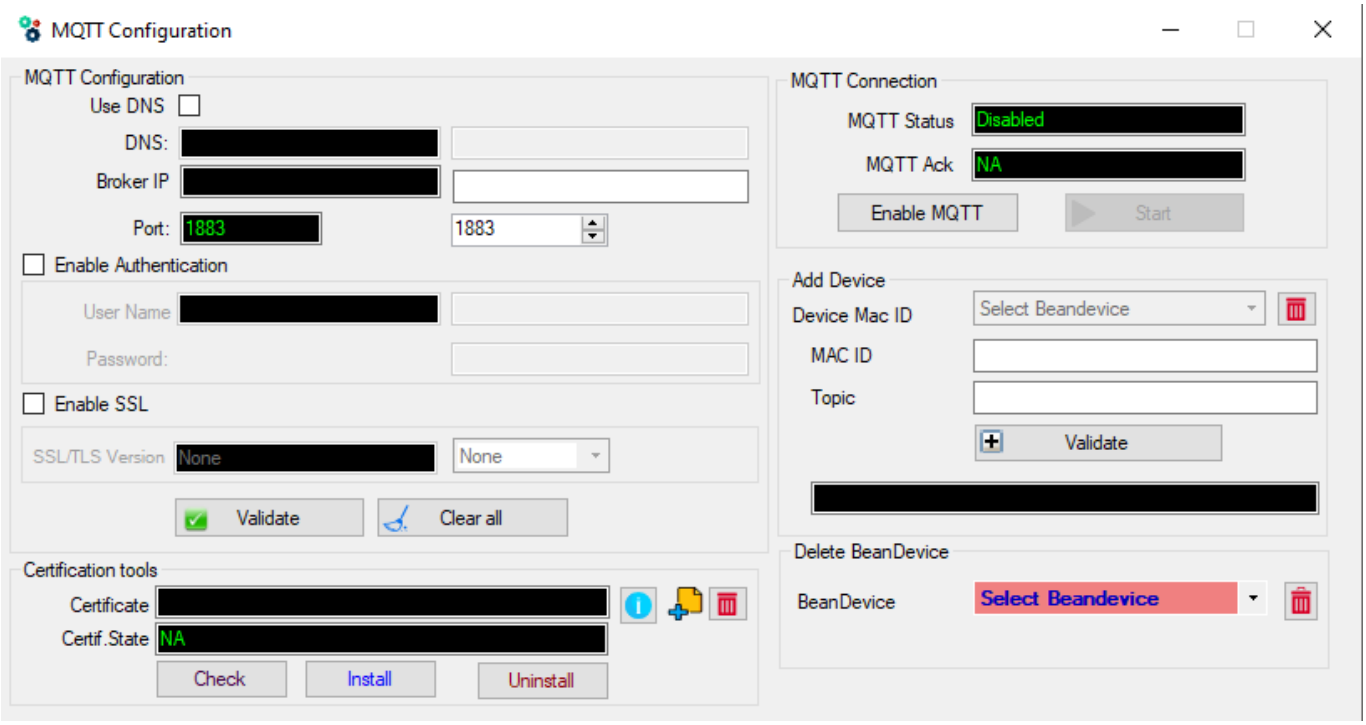


Figure 37: MQTT Configuration Main window

10.2.1 MQTT Configuration

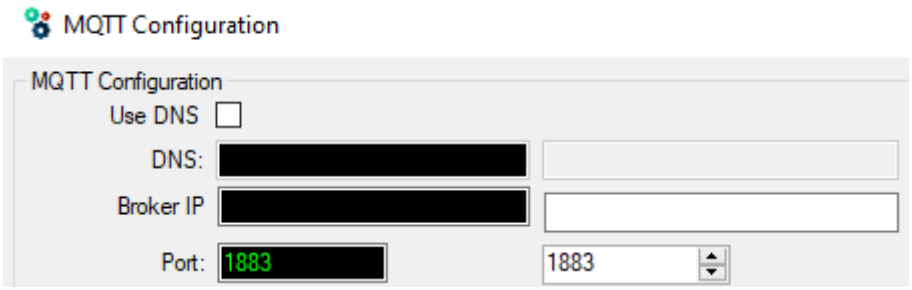


Figure 38: Broker Config

- ***Use DNS***: check if you want to enter your broker DNS.
- ***DNS***: domain name server of your Broker
- ***Broker IP***: enter your broker IP address after unchecking Use DNS box.
- ***Port***: TCP/IP port to use with MQTT. 1883 and 8883 are the reserved ports for use with MQTT

10.2.2 Enable Authentication

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

Figure 39: Authentication frame

Check Enable Authentication box to enter the settings

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

10.2.3 Enable SSL

Enable SSL for secure MQTT communication

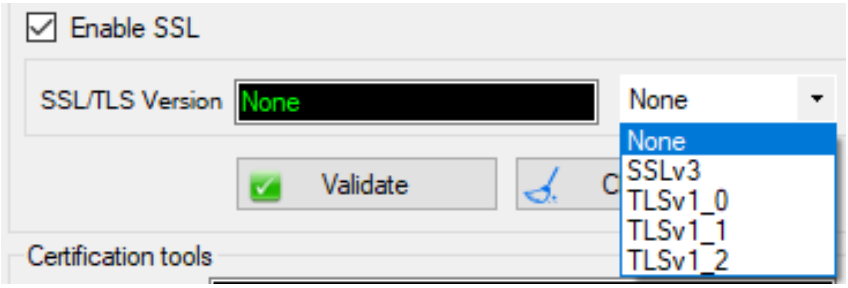


Figure 40: SSL/TLS Config

Choose your SSL/TLS version then click on validate button.

10.2.4 Certification tools

Enter the Server's root certification, then configure the secure socket options

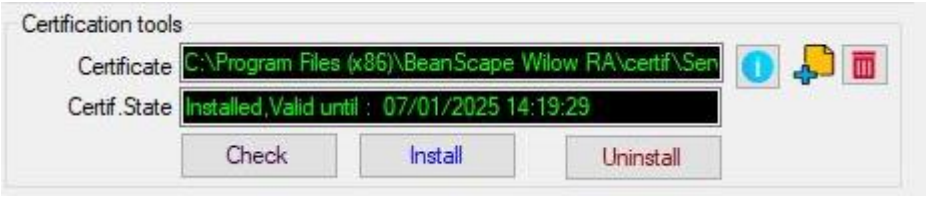


Figure 41: Certification Config

- ***Check:*** press the check bouton to check if the certification is already installed or not.
- ***Install:*** choose the right certification path then click install to install it
- ***Uninstall:*** uninstall the current installed certification
- ***:*** Help notes
- ***:*** Add the certification path
- ***:*** Delete the certification path

- ***Certificate frame:*** shows the current certificate path
- ***Certif. State:*** shows the current status of the certification (installed/Validate…)

10.2.5 MQTT Connection

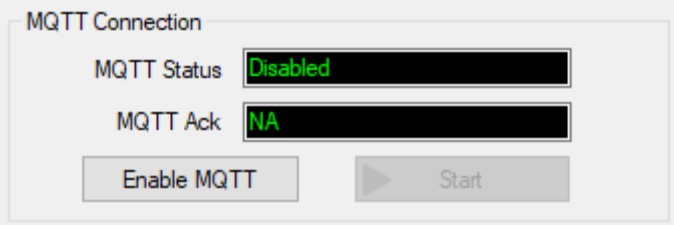


Figure 42: MQTT Connection Config

- ***MQTT Status:*** shows the current status of the MQTT Connection (Enabled/Disabled)
- ***MQTT Ack:*** shows if the communication to the broker IP was done successfully or not (Connected/Disconnected/BadConfig/NA)
- ***Enable/Disable MQTT:*** enable or disable the MQTT communication
- ***Start:*** to start the communication

10.2.6 Add BeanDevice®

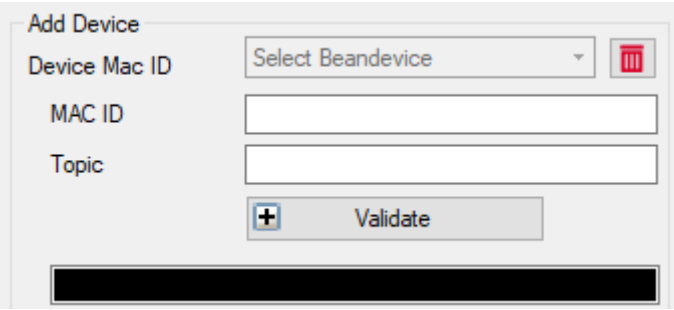


Figure 43: Add BeanDevice® option

Enter the BeanDevice® MAC ID and Topic then click on validate.

10.2.7 Delete BeanDevice®

Figure 44: Delete BeanDevice® option

Scroll down the menu and select the BeanDevice® MAC ID then click on the red icon to delete it.

10.1 APPENDIX 2: FIREWALL EXCEPTION FOR BEANSCAPE®

By default, firewall blocks all unknown network traffic coming in to the network. To permit traffic through the firewall we create exceptions (or rules) that allow certain traffic on the network. In our case the rules are defined by the software which is BeanScape.

Usually when launching BeanScape for the first time your Windows OS will ask you to add an exception and to allow the software to use your network resources, however in case this doesn't occur or rejected, manually adding BeanScape to exceptions list is possible through these following steps:

1. Use your Search bar at the windows launcher and look for "Allow an app through Windows Firewall"

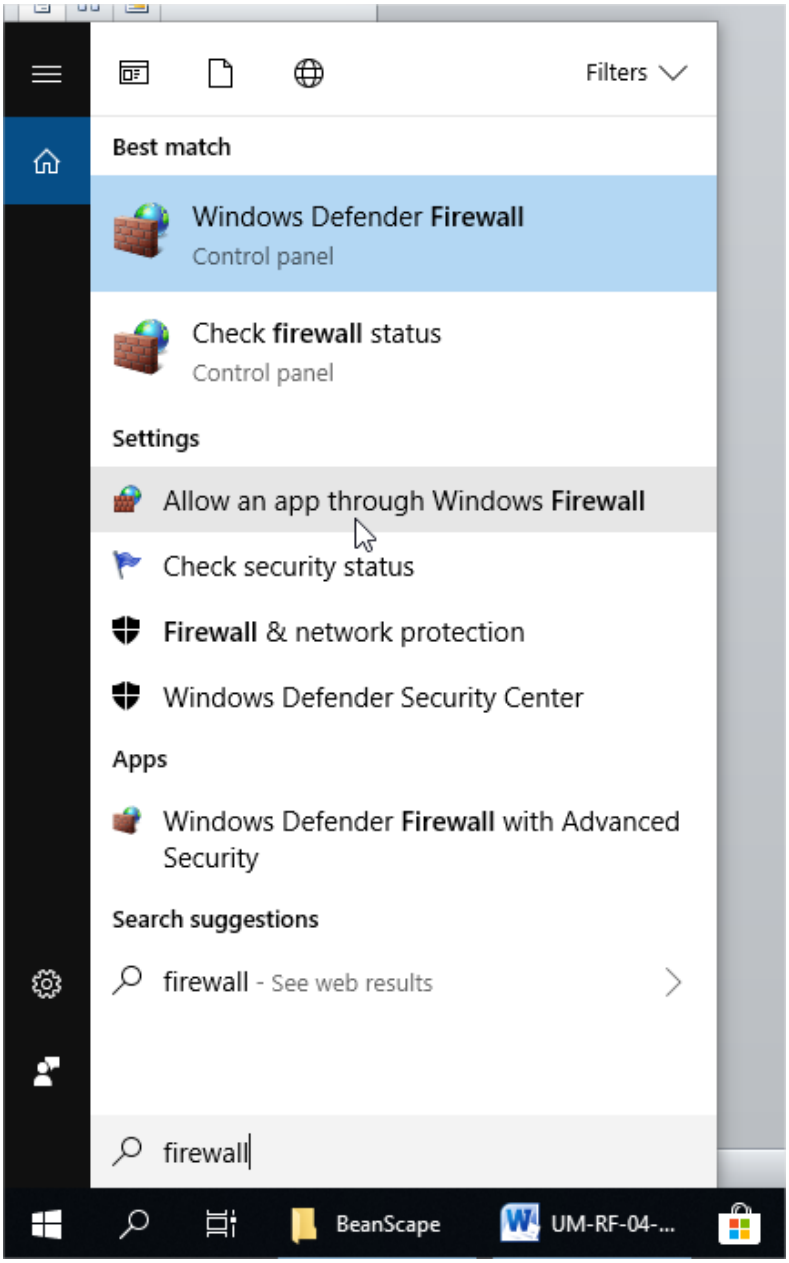


Figure 45 Windows search for firewall screenshot

2. Look for BeanScape in the list and check its box, check Private if you are only willing to use BeanScape in your LAN or Public for allowing remote access from outside the LAN.Validate and your BeanScape will be allowed in your network.

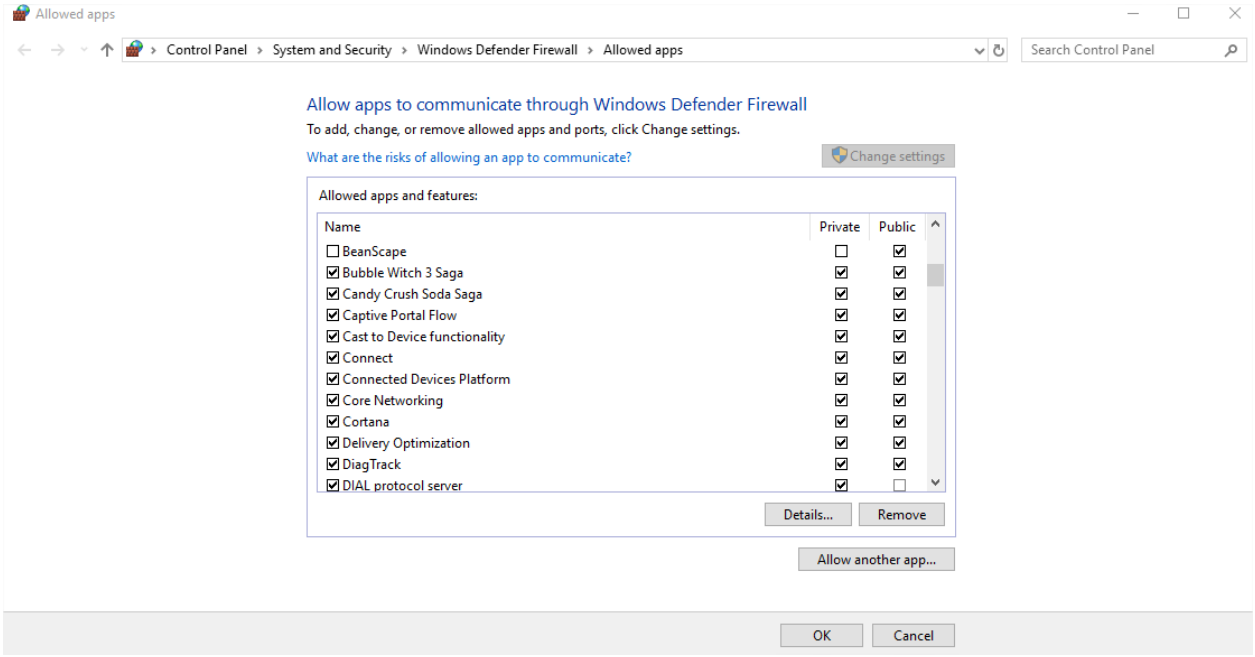


Figure 46 :allowed apps window

10.2 APPENDIX 3: SSL CONFIGURATION FOR TELTONIKA MQTT BROKER

The Teltonika MQTT Broker is the Server and BeanScape®/BeanDevice® are the client.

To Configure the SSL for the broker user, need to follow these steps.

- Enable of course the broker and precise your port.

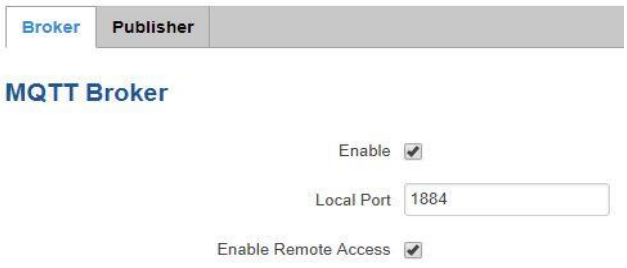


Figure 47: MQTT Broker

- Enable TLS/SSL option and update the 3 files:

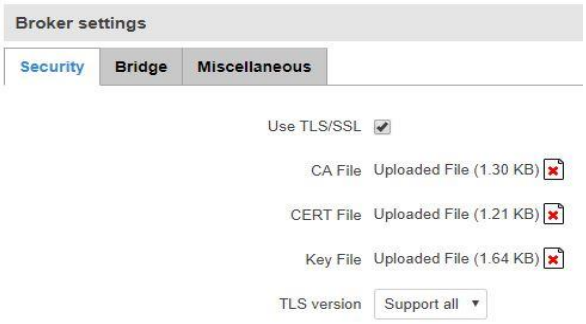


Figure 48 Broker Settings

- **CA File**: the root CA file of the client, the server may request the client certificate to verify it.
- **CERT file**: the server certificate
- **Key File:** the server private key.