Version 1.1



**TECHNICAL NOTE** 

BeanDevice<sup>®</sup> Wilow - Using MQTT with LabVIEW



## www.beanair.com



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Author	Seddik ATTIG	Х		

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# **Contents**

1.	TECHNICAL SUPPORT
2.	VISUAL SYMBOLS DEFINITION
3.	AIM OF THE DOCUMENT
1.	OVERVIEW7
2.	INSTALATION AND ENVIRONMENT CONFIGURATION9
	2.1 Network
	2.2 BeanDevice® MQTT Configuration
	2.3 LabVIEW MQTT Configuration
	2.3.1 Getting started15
	2.3.2 Setup the environment15
	2.3.3 MQTT Configuration on LabVIEW toolkit16
	2.3.4 Subscription Options (Read the measurements)17
	2.3.5 Publish Options (Read the measurements)
3.	RELATED DOCUMENTS & VIDEOS





Document Type: Technical Note

Reference: TN-RF-27

BeanDevice® Wilow - Using MQTT with LabVIEW

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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<sup>®</sup>'s Technical Support Center (BTSC).

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





Document Type: Technical Note

Reference: TN-RF-27

BeanDevice<sup>®</sup> Wilow - Using MQTT with LabVIEW

## 2. VISUAL SYMBOLS DEFINITION

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





Document Type: Technical Note

Reference: TN-RF-27

BeanDevice® Wilow - Using MQTT with LabVIEW

## 3. AIM OF THE DOCUMENT

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

This document is aimed to give you a step by step tutorial how to use the LabVIEW toolkit.



	"Rethinking sensing technology"	Document version: 1.0
BeanAir	Document Type: Technical Note	BeanDevice® Wilow - Using MQTT with LabVIEW
	Reference: TN-RF-27	

## **1. OVERVIEW**

The idea is to introduce the BeanDevice to the internet of things using the MQTT protocol and the LabVIEW software.



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



#### **Data collection**





**BeanDevice Configuration over MQTT** 





## 2. INSTALATION AND ENVIRONMENT CONFIGURATION

## 2.1 NETWORK

To get started using your BeanDevice Wilow over MQTT and before starting the configuration you need to install an MQTT broker on any embedded computer or SBC of your choice (Raspberry PI, Beagle bone black,) Alternatively, even use a windows system (like in this example), also you can simply use an online broker (free with limits) or you can use the MQTT broker hosted on the Teltonika router if you have one, next build your Wi-Fi network and make sure you follow the network architecture shown in the figure below.



## 2.2 BEANDEVICE® MQTT CONFIGURATION

In order to start the MQTT communication you have to setup the MQTT configuration using BeanScape, after connecting the BeanDevice to the network.

Select your BeanDevice and scroll down to MQTT in the BeanDevice tab.





File Server Tools Off. Data Analysis	Advanced func. Help
i 🛃 🛛 📴 🖉 🧕 🧾	Enable measure log
MAC_ID : 0 x F0B5D1A48F4E0000	Disable measure log
Ch_X	Clear graphs for all the sensors
Ch_Y	Display Wireless Network Information
	Sensor Configuration ):
INC_Y	MQTT r:
	Label :

A new window will pop up from which you will configure the BeanDevice MQTT module.

To make things simple we will not use the security feature in this example (SSL/TLS and Certif options).

MQTT Module : MAC_ID : 0 x F0B5D1A48F4E0000	X
Port: 1993	MQTT Status MQTT Status: Stopped Stop Validate
IP Broker: 0.0.0.0	MQTT Ack: NA Restart
DNS: DNS: Validate	Topic for static measurement Publish Status: Disabled
Authentication Usemame:	Topic Name: Default
Password:	Validate
Validate SSL/TLS Config	Topic for dynamic measurement
Security choice : Disabled Disabled Security Protocol Version: SSLv3_0 ×	Streaming Topic:
Cipher : Automatic	Validate
Validate config	Subscription status: Disabled
Certif	Topic Name: Default
CA file Name : NA	Validate
CA file Valid from : NA	Keep Alive
Upload Status	Version: V3R1R1 V3R1R1 V
File Status         NA           Upload Status         NA	Auto.gen.ID Client:
Byte Transferred 0%	ID Client: Validate





## <u>Broker</u>

MQTT Module : MAC\_ID : 0 x A4D57843DED30000

Broker Port:	1883	1883
DNS Status:	Disabled	
IP Broker:	192.168.1.32	
DNS:		
	[ S Import	Validate

- Port: TCP/IP port to use with MQTT .1883 and 8883(secured port, over SSL/TLS) are the reserved (default) ports for MQTT.
- **DNS** Status: check it if you want to use your broker DNS otherwise uncheck it if you want to use your broker ip address.
- **IP Broker**: enter your broker Ip address (make sure to uncheck the DNS Status).
- **DNS**: enter the DNS (domain name server) of your Broker (make sure to check the DNS Status)
- **Import button**: Import saved configuration (last used configuration).
- **Validate**: confirm and save your broker configuration.

## **Authentication**

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

Authentication Usemame:		
Password:		
	Validate	

- **Username:** specify your user name
- **Password:** enter your password
- **Validate**: save your configuration.





## Keep alive

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

Keep Alive		
Interval :	60	60
Version:	V3R1R1	V3R1R1 ~
Auto.gen.ID Client:	1	$\checkmark$
ID Client:	WILO0366891585134266273	
		Validate

- Interval: The interval is the longest possible period of time, within the broker and the client can endure without exchanging a message.
- Version: MQTT Protocol version
- Auto.gen.ID Client: check for auto generate a Client ID
- *Client ID*: Enter your client ID manually (make sure to uncheck Auto\_gen.ID Client)
- **Validate**: save your configuration.

## **Topic for static measurement**

The topic is a string used by the broker to filter messages for each connected client.

"Topics for static measurement" section is related only to LowDutyCycle and Alarm modes.

In static mode (LDC or Alarm) each sensor in the BeanDevice will publish its measurements to a specific and well reserved topic.

In our case we will subscribe to those Topics to receive the static measurements from each sensor.

For better and easy use, Topic names are not configurable and they are as follow:

[BeanDevice MAC-ID]/SENSOR/[sensor-ID]

For Example: F0B5D1A48F4E0000/SENSOR/0

F0B5D1A48F4E0000: BeanDevice mac id

0: channel Z







- **Publish Status:** check it to enable publishing.
- **ID** Channel: channel identification, select sensor from the list.
- **Topic Name:** display the used Topic name to publish measurement to (not configurable).
- **Default:** to set a default configuration. You need to click this button to set the Topic name.
- **Validate:** save your configuration.

## Topic for dynamic measurement

Here you enable the Topic for dynamic measurements and it works only for the streaming, S.E.T and Shock Detection modes.

The BeanDevice will publish all measurement for all sensors to a single Topic.

Again, the topic name is not configurable and you can only enable or disable this option.

The topic format is as follow:

#### [BeanDevice\_MAC-ID]/STREAMING

For Example: F0B5D1A48F4E0000/STREAMING

#### F0B5D1A48F4E0000: BeanDevice ID



- MQTT\_status: check it to enable publishing
- *Streaming Topic:* display the used Topic name to publish measurement to (not configurable).
- **Default:** to set the default configuration. You need to click this button to set the Topic name.
- **Validate:** save your configuration.

	"Rethinking sensing technology"	Document version: 1.0
BeanAir	Document Type: Technical Note Reference: TN-RF-27	BeanDevice® Wilow - Using MQTT with LabVIEW

## <u>Subscribe</u>

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

Subscription Subscription status:	Enabled	2
Topic Name:	F0B5D1A48F4E0000/OTAC	Default
	F0B5D1A48F4E0000/OTAC	Validate

- **Subscription status:** check it to enable subscribing.
- **Topic Name:** Field to enter your topic's name to subscribe to.
- **Default:** to set the default configuration. You need to click this button to set the Topic name.
- **Validate:** save your configuration.

## <u>MQTT STATUS</u>

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

MQTT Status				
MQTT Status:	Connected	Start	$\sim$	Validate
MQTT Ack:	NA			Restart

**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
- **Start/Stop:** select to start or to stop your MQTT Client connection
- **Restart:** restart your connection





## 2.3 LABVIEW MQTT CONFIGURATION

#### 2.3.1 Getting started

For anyone who wants to start using LabVIEW to collect data from a BeanAir Wilow WSN we provide you examples for both, static and dynamic modes with real time graph results.

#### 2.3.2 Setup the environment

After installing the executable setup, don't forget to check install the related installer package.

📥 Setup - Mqtt labview toolkit versi	ion 1.0 — 🗆 >
	Completing the Mqtt labview toolkit Setup Wizard
	Setup has finished installing Mqtt labview toolkit on your computer. The application may be launched by selecting the installed shortcuts.
	Click Finish to exit Setup.
(IIO)	Launch related installer

Then you have to restart your computer.

Labviev	v_Mqtt_Toolkit		—		×
U	You must restart yo If you need to insta choose to restart la software.	our computer to complete this Il hardware now, shut down t Iter, restart your computer bef	operation. he compu ore runnin	ter. If you g any of th	is
	Restart	Shut Down	Re	estart Late	r





Then allow the application though firewall for both Public and Private.

P Windows Security Alert					
Windows Defender Firewall has blocked some features of this app					
Windows Defender networks.	Firewall has blo	cked some features of My Application on all public and private			
- = ×	Name:	My Application			
	Publisher:	Beanair			
	Path:	C:\program files (x86)\mqtt labview toolkit \abview_mqtt_toolkit.exe			
Allow My Applicatio	n to communica	te on these networks:			
Private netw	orks, such as m	y home or work network			
Public netwo because the	Public networks, such as those in airports and coffee shops (not recommended because these networks often have little or no security)				
What are the risks of allowing an app through a firewall?					
		Allow access Cancel			

## 2.3.3 MQTT Configuration on LabVIEW toolkit

#### 2.3.3.1 Broker configuration

After launching the LabVIEW application navigate to **configuration** tab where you will enter the broker configuration.

Under Broker configuration section, you have to enter the right broker settings

Configuration		LowDutyCycle	Data	AlarmData	
		Broker c	onfigura	ation	
	IP or URL	of the broker			٦
		port	1883		
(	Conn	ection Success	;		





- IP or URL of the broker: Enter the broker IP address or its URL
- *Port:* Enter the MQTT port number (1883 default MQTT port number).

Then click on connect button

Connect

if all the settings are correct the connection LED will turn to green color.

Broker configuration					
IP or URL of the broker 192.168.1.32					
port	1883				
Connection Success					

#### 2.3.4 Subscription Options (Read the measurements)

## 2.3.4.1 Example with Static DAQ mode

## 2.3.4.1.1 Topic Name configuration

From the same **configuration** tab, navigate to Subscription\_Info section, and enter the topic name for static measurement mode (LowDutyCycle & Alarm).



Then click on **Subscribe** button.

Subscribe

The subscription LED will turn to green.

		Subscription_Info	
	Topic	A4D57843DED30000/SENSOR/0	Subscribe
0	Subscribe	Success	







Do not exceed 30s, between the broker configuration and the topic name configuration otherwise there will be a time out issue and the operation will not be valid and you have to reconfigure everything again.

If you face a time out issue during the configuration, just Click on Quit button Quit , then click on the arrow icon to start again from the scratch.

Configura	tion	LowDutyCycleData	AlarmData	StreamingModeData	S.E.T Mode	Dynamic Math Result	
ĺ		Broker configur	ation		Subscription	1_Info	
	IP or URL	of the broker port 1883		Торіс	MacID/Topic	St	ıbscribe
	Connection Success		Subscrib	e Success			
	Conne	ct Quit		Subscribed_	Topic		

#### 2.3.4.1.2 Data acquisition configuration on the BeanScape software

Once you validate the configuration successfully, go back to the BeanScape<sup>®</sup> software and start new Low Duty Cycle DAQ mode.

Display configuration Notes	Data Acq. config.	SSD Config.	Online Data Ar	nalysis	DataLog	• •
Data acquisition mode confi	guration					^
Data Acq. mode : Lo	wDutyCycle	~	Start			
Data Acq. cycle :	::02 ddd, hh:r	nm:ss	Stop			
TX_Ratio: 1						
Math Notif. ratio 2						
Math Notif. cycle will be : 00.	:00:02 hh:mm:ss					
Data acquisition mode opti	ons					
Tx Only () Log O	nly ⊖Tx	&Log 🔾	SA			
Streaming Packet Options						
Continuous Monitoring	<ul> <li>Burst</li> </ul>	0	One Shot			
Store and Forward						
SF Enabled	Data Aging: 3	0				
						~







Once you start the data acquisition you can close the BeanScape software, it's only needed for the BeanDevice configuration.

#### 2.3.4.1.3 Measurement and graph display

Now from the LabVIEW interface navigate to Low Duty Cycle tab to see the graph and the measurement results.

Configuration	LowDutyCycleData	AlarmData	StreamingModeData	S.E.T Mode	Dynamic Math Res	ult
	LowDutyCycle N	<b>Leasurement</b>			MathMode Res	ult
File path	B\			File path 8\		
Device	type AX-3D			Start Date	7/13/2022 9:26:36	AM
Measure	Mode LDCDA mod	e		End Date	7/13/2022 9:26:38	AM
Sensor	Label Ch_Z			Maximum value	-0.855 Date	7/13/2022 9:26:36
Date &	time 7/13/2022 9:2	.6:40 AM		Minimum value	-0.86 Date	7/13/2022 9:26:38 AM
Meas	ure -0.851			Average value	-0.857	
Measure	Graph				,	Plot 0
-0.840- -0.845- -0.850- -0.855- -0.855- -0.860- -0.865-						

The BeanDevice identity and related information will be displayed on the left-hand screen.

LowDutyCycle Measurement					
File path					
Device type	AX-3D	Í			
Measure Mode	LDCDA mode				
Sensor Label	Ch_Z				
Date & time	7/13/2022 9:29:18 AM				
Measure	-0.854				





And the Math mode results for static measurements will be displayed on the right-hand screen.

MathMode Result					
File nath					
inc part					
Start Date	7/13/2022 9:30:28 AM				
End Date	7/13/2022 9:30:30 AM				
Maximum value	-0.854 Date 7/13/2022 9:30:30				
Minimum value	-0.856 Date 7/13/2022 9:30:28 AM				
Average value	-0.855				

The graph will be displayed below with the measurements time and value.









Zooms in an area of the graph or chart.

Zooms in an area of the graph or chart on the X-axis.



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Zooms in an area of the graph or chart on the Y-axis.

Zooms in or out to auto scale the graph or chart.

Zooms in. Hold <shift> to zoom out while you are zooming in, and release <shift> to zoom in again.

## -++++--

<sup>\*</sup> Zooms out. Hold <shift> to zoom in while you are zooming out, and release <shift> to zoom out again.

If you want to clear the graph just right click on the chart then click on clear chart.



## 2.3.4.1.4 Logfiles

To check the logfiles, just click on the File path area.

File path 8 ...\...

Then copy the path.

File path & A4D57843DED30000\_Ch\_Z\_transmit\_LowDutyCycle.csv

And paste it in the search bar of windows file explorer.



	"Rethinking sensing technology"	Document version: 1.0		
BeanAir				
	Document Type: Technical Note	BeanDevice® Wilow - Using MQTT with LabVIEW		
	Reference: TN-RF-27			
🐂   🕑 🔜 🚽   File Explorer				
File Home Share	View			

← → ✓ ↑ C:\Users\GraphicDesigner\Documents\Logfile\A4D57843DED30000\_Ch\_Z\_transmit\_LowDutyCycle.csv

By default, all the logfiles will be saved under C:\Users\your\_profile\_name\Documents\Logfile

C:\Users\GraphicDesigner\Documents\Logfile		ٽ ~	
Name	Date modified	Туре	Size
A4D57843DED30000_Ch_Z_transmit_LowDutyCycle.csv	7/13/2022 11:35 AM	Microsoft Excel C	68 KB
A4D57843DED30000_Ch_Z_Transmit_Math_LowDutyCycle.txt	7/13/2022 11:34 AM	Text Document	235 KB

All the measurement data will be saved in a CSV file while the Math results will be backed up in a Txt file.

👾 🗇 - 🐡 - 👘 - A4D57843DED30000_Ch_Z_transmit_LowDutyCycle.csv - Excel Sign in 💷 D	A4D57843DED30000_Ch_Z_fransmit_Math_LowDutyCycle.txt - Notepad - X
Ella Marena Jarrant Bana Javant Farmular Data Bananu View Mala 🖓 Tall one what you want to do	Shave File Edit Format View Help
rite nome insett Page Layout Formulas Data Neview View Telp V Harne what you want to do	📩 📩 δtart Date 7/11/2022 8:19:42 AM;End Date 7/11/2022 8:19:44 AM;Event Date 7/11/2022 8:19:44 AM;Maximum value -0.853 🔺
🚰 👗 🕹 Conditional Formatting * 📰 Insert * 💟 * 💆	Start Date 7/11/2022 8:19:42 AM; End Date 7/11/2022 8:19:44 AM; Event Date 7/11/2022 8:19:42 AM; Minimum value -0.856
S v % v Polete v V v P	Start Date         7/11/2022         8:19:42         AM; End Date         7/11/2022         8:19:44         AM; Event Date NA         ; Average value -0.854
Paste B I U - D - A - E = E E E E E E E Cal Styles -	Start Date 7/11/2022 8:19:46 AM;End Date 7/11/2022 8:19:48 AM;Event Date 7/11/2022 8:19:48 AM;Maximum value -0.851
Tinhand " East " Minnant " Munker " Diday Calls	Start Date 7/11/2022 8:19:46 AM;End Date 7/11/2022 8:19:48 AM;Event Date 7/11/2022 8:19:46 AM;Minimum value -0.866
Cupoard is Port is Angineent is Number is Sayes Cens County	Start Date 7/11/2022 8:19:46 Anjthd Date 7/11/2022 8:19:48 Anjtevent Date NA jAverage value -0.855 (Start Date 7/11/2022 8:19:46 Anjtevent)
POSSIBLE DATA LOSS     Some reasures might be lost if you save this wonkbook in the comma-desimited (.csv) tormat. Io     Don't show again     Save J	x Start Date 7/11/2022 0:19:30 Amging Date 7/11/2022 0:19:32 Amging the tate 7/11/2022 0:19:32 Amging multi value -0.055 Chart Date 7/11/2022 0:19:00 Amging Date 7/11/2022 0:19:52 Amging value -0.055 Amg
	Start Date 7/11/2022 8:19:50 AM:End Date 7/11/2022 8:19:52 AM:Event Date NA :Average value -0.855
A1 * : × ✓ fx Device Type ;Measure mode;Sensor label;date & time;Measure	Start Date 7/11/2022 8:19:54 AN; End Date 7/11/2022 8:19:56 AM; Event Date 7/11/2022 8:19:56 AM; Maximum value -0.853
	Start Date 7/11/2022 8:19:54 AM;End Date 7/11/2022 8:19:56 AM;Event Date 7/11/2022 8:19:54 AM;Minimum value -0.856
A B C D E F G H I J K L M I	Start Date 7/11/2022 8:19:54 AM;End Date 7/11/2022 8:19:56 AM;Event Date NA ;Average value -0.854
Device type (measure mode) sensor tabe; caste & time; measure	Start Date 7/11/2022 8:19:58 AM;End Date 7/11/2022 8:20:00 AM;Event Date 7/11/2022 8:19:58 AM;Maximum value -0.852
2 AX-30;LDCDA mode;Ch_2;//11/2028:19:42 AM:-0.856	Start Date 7/11/2022 8:19:58 AM;End Date 7/11/2022 8:20:00 AM;Event Date 7/11/2022 8:20:00 AM;Minimum value -0.853
3 AX-30;LDCDA mode;Ch_2;//11/2022 8:19:44 AM;-0.853	Start Date 7/11/2022 8:19:58 AM;End Date 7/11/2022 8:20:00 AM;Event Date NA ;Average value -0.852
4 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:19:46 AM;-0.860	Start Date 7/11/2022 8:20:02 AM; End Date 7/11/2022 8:20:04 AM; Event Date 7/11/2022 8:20:02 AM; Maximum value -0.855
5 AX-30;LDCDA mode;Cn_2; //11/2022 8:19:48 AM;-0.851	Start Date 7/11/2022 8:20102 AM Start Date 7/11/2022 8:20104 AM Struct Date 1/11/2022 8:20104 AM Structure value -0.85/
6 AX-3D/L0CDA mode;cn_2;7/11/2022 8:19:30 AM;-0.856	Start Date 7/11/2022 8:20-06 AMIEnd Date 7/11/2022 8:20-08 AMIEuron Date 7/11/2022 8:20-08 AMIeuron Date 7/11/2023
7 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:19:52 AM;-0.855	Start Date 7/11/2022 8:20:06 AM:End Date 7/11/2022 8:20:08 AM:Event Date 7/11/2022 8:20:06 AM:Minimum value -0.850
8 AX-30;LDCDA mode;Ch_2;7/11/2022 8:19:54 AM;-0.856	Start Date 7/11/2022 8:20:06 AM;End Date 7/11/2022 8:20:08 AM;Event Date NA ;Average value -0.849
9 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:19:56 AM;-0.853	Start Date 7/11/2022 8:20:10 AM; End Date 7/11/2022 8:20:12 AM; Event Date 7/11/2022 8:20:12 AM; Maximum value -0.854
10 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:19:58 AM;-0.852	Start Date 7/11/2022 8:20:10 AM;End Date 7/11/2022 8:20:12 AM;Event Date 7/11/2022 8:20:10 AM;Minimum value -0.855
11 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:00 AM;-0.853	Start Date 7/11/2022 8:20:10 AM;End Date 7/11/2022 8:20:12 AM;Event Date NA ;Average value -0.854
12 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:02 AM;-0.855	Start Date 7/11/2022 8:20:14 AM;End Date 7/11/2022 8:20:16 AM;Event Date 7/11/2022 8:20:16 AM;Maximum value -0.852
13 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:04 AM;-0.857	Start Date 7/11/2022 8:20:14 AM;End Date 7/11/2022 8:20:16 AM;Event Date 7/11/2022 8:20:14 AM;Minimum value -0.853
14 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:06 AM;-0.850	Start Date 7/11/2022 8:20:14 AM;thd Date 7/11/2022 8:20:16 AM;tvent Date NA ;Average value -0.852
15 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:08 AM;-0.849	Start Date //11/2022 8:20:18 AM the Date //11/2022 8:20:20 AM the Date //11/2022 8:20:18 AM that mum value -0.851
16 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:10 AM;-0.855	Start Date 7/11/2022 0.2018 AM-End Date 7/11/2022 0.2019 AM-Event Date 7/11/2022 0.2019 Am-Filindian Value 0.053
17 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:12 AM;-0.854	Start Date 7/11/2022 8:20:22 AN: End Date 7/11/2022 8:20:24 AN: Event Date 7/11/2022 8:20:22 AM: Maximum value -0.857
18 AX-30;LDCDA mode;Ch_2;7/11/2022 8:20:14 AM;-0.853	Start Date 7/11/2022 8:20:22 AM;End Date 7/11/2022 8:20:24 AM;Event Date 7/11/2022 8:20:24 AM;Minimum value -0.863
19 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:16 AM;-0.852	Start Date 7/11/2022 8:20:22 AM;End Date 7/11/2022 8:20:24 AM;Event Date NA ;Average value -0.860
20 AX-30;LDCDA mode;Ch_Z;7/11/2022 8:20:18 AM;-0.851	Start Date 7/11/2022 8:20:26 AM;End Date 7/11/2022 8:20:28 AM;Event Date 7/11/2022 8:20:28 AM;Maximum value -0.851
21 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:20 AM;-0.855	Start Date 7/11/2022 8:20:26 AM;End Date 7/11/2022 8:20:28 AM;Event Date 7/11/2022 8:20:26 AM;Minimum value -0.852
22 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:22 AM;-0.857	Start Date 7/11/2022 8:20:26 AM;End Date 7/11/2022 8:20:28 AM;Event Date NA ;Average value -0.851
23 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:24 AM;-0.863	Start Date 7/11/2022 8:20:30 AM;End Date 7/11/2022 8:20:32 AM;Event Date 7/11/2022 8:20:32 AM;Maximum value -0.854
24 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:26 AM;-0.852	Start Date //11/2022 8:20:30 AMjtnd Date //11/2022 8:20:32 AMjtvert Date //11/2022 8:20:30 AMjtinimum Value -0.856
25 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:28 AM;-0.851	Start Date 7/11/2022 6:20:30 Arginto Date 7/11/2022 6:20:32 Arginto Date ma
26 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:30 AM;-0.856	Start Date 7/11/2022 8:20:34 AM:End Date 7/11/2022 8:20:36 AM:Event Date 7/11/2022 8:20:34 AM:Minimum value -0.850
27 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:32 AM;-0.854	Start Date 7/11/2022 8:20:34 AM:End Date 7/11/2022 8:20:36 AM:Event Date NA :Average value -0.850
28 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:34 AM;-0.850	Start Date 7/11/2022 8:20:38 AM;End Date 7/11/2022 8:20:40 AM;Event Date 7/11/2022 8:20:38 AM;Maximum value -0.853
29 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:36 AM;-0.850	Start Date 7/11/2022 8:20:38 AM; End Date 7/11/2022 8:20:40 AM; Event Date 7/11/2022 8:20:38 AM; Minimum value -0.853
30 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:38 AM;-0.853	Start Date 7/11/2022 8:20:38 AM;End Date 7/11/2022 8:20:40 AM;Event Date NA ;Average value -0.853
31 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:40 AM;-0.853	Start Date 7/11/2022 8:20:42 AM;End Date 7/11/2022 8:20:44 AM;Event Date 7/11/2022 8:20:42 AM;Maximum value -0.853
32 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:42 AM;-0.853	Start Date 7/11/2022 8:20:42 AM;End Date 7/11/2022 8:20:44 AM;Event Date 7/11/2022 8:20:44 AM;Minimum value -0.860
33 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:44 AM;-0.860	Start Date //11/2022 8:20:42 ANjEnd Date //11/2022 8:20:44 ANjEvent Date NA
34 AX-3D;LDCDA mode;Ch_2;7/11/2022 8:20:46 AM;-0.854	Start Date //11/2022 0:20:40 ANjthd Uate //11/2022 8:20:48 ANjthent Uate //11/2022 8:20:46 AMjMaximum value -0.854
35 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:48 AM;-0.854	Start Date 7/11/2022 8:20:46 AM-Find Date 7/11/2022 8:20:48 AM-EVENT Date 7/11/2022 8:20:46 AM-Findhamm Value -0.854
36 AX-3D;LDCDA mode;Ch_Z;7/11/2022 8:20:50 AM;-0.853	- Start Date 7/11/2022 8:20:50 AM:End Date 7/11/2022 8:20:52 AM:Event Date 7/11/2022 8:20:52 AM:Maimum value -0.852
	Start Date 7/11/2022 8-20-50 AM-End Date 7/11/2022 8-20-52 AM-Event Date 7/11/2022 8-20-50 AM-Minimum value -0.853 *
	· · · · · · · · · · · · · · · · · · ·
Ready 📖 🖽 –	+ 100% En 1, Col 1 100% Windows (CRLF) UTF-8

## 2.3.4.2 Example with Dynamic DAQ mode

#### 2.3.4.2.1 Topic Name configuration

From the same **configuration** tab, navigate to Subscription\_Info section, and enter the topic name for dynamic measurement mode (Streaming & S.E.T).





Subscription_Info						
Topic	A4D57843DED30000/SENSOR/0					

Then click on **Subscribe** button.

Subscribe

The subscription LED will turn to green.

Ľ			
	Topic	A4D57843DED30000/STREAMING	Subscribe
	Subscribe	Success	

#### 2.3.4.2.2 Data acquisition configuration on the BeanScape software

Once you validate the configuration successfully, go back to the BeanScape<sup>®</sup> software and start new Low Duty Cycle DAQ mode.

isplay configuration	Notes	Data Acq.	config.	SSD Config	g. Online Data	Analysis	DataLog	•	۲
Data acquisition mo	de confi	guration —							^
Data Acq. mod	e: St	reaming		$\sim$	Start	]			
Data Acq. cycl	e:	:01:00	ddd, hh:r	nm:ss	Stop	]			
Sampling Ra	ate: 10	× 00	Hz			-			
Data Acq. duratio	n :	::30	ddd,hh:i	mm:ss					
Math mode enabled	√ ode opti	ons							
Tx Only	) Log (	nly	⊖ Tx	& Log	🔿 SA				
Streaming Packet	Options onitoring		Burst	(	One Shot				
Store and Forward		Data Agir	ng: <sup>3</sup>	0					
									~



Once you start the data acquisition you can close the BeanScape software, it's only needed for the BeanDevice configuration.





## 2.3.4.2.3 Measurement and graph display

Now from the LabVIEW interface navigate to StreamingModeData tab to see the graph and the measurement results.



The BeanDevice identity and related information will be displayed on the left-hand screen.

File path 8
synchronised
Device Type AX-3D
Measure Mode Streaming mode burst
Enabled channels chZ& chX& chY
Sampling rate 100
Number of daq per channel 30
Prev.Number of daq per channel 110
Data acquisition duration 30
Data acquisition cycle 60
Frame sequence Id 27
Network Quality (LQI) 175
Time Ref 7/13/2022 10:56:03 AM millisec 20



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The graph will be displayed at the right-hand of the screen.



## Navigate to Dynamic Math Results tab to see the Math mode values.

File weath				(h 7			INC Y	
File path	·\				Cn_X	Cn_r		INC_T
Enabled c	nannels chZ& c	:hX& chY	Min date	7/13/2022 12:56:40 PM	7/13/2022 12:56:41 PM	7/13/2022 12:56:40 PM		
			Min value	-0.887	-0.018	-0.016	0	0
Device	type AX-3D			<i>p</i>	,	,		
Acquisition	duration 30		Max date	7/13/2022 12:56:39 PM	7/13/2022 12:56:40 PM	7/13/2022 12:56:51 PM		
Acquisitio	n cycle 60		Max value	-0.828	0.022	0.01	0	0
Acquisition	frequency 100		 Average value	-0.855	0	-0.001	0	0





with LabVIEW

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#### 2.3.4.2.4 Logfiles

To check the logfiles, just click on the File path area.

File path 8 ...\...

Then copy the path.

File path 8 10\_56\_03 A\_A4D57843DED30000 \_streaming.csv

And paste it in the search bar of windows file explorer.



By default, all the logfiles will be saved under C:\Users\your\_profile\_name\Documents\Logfile

📴 C:\Users\GraphicDesigner\Documents\Logfile	ٽ ~	🔎 Search Lo	
Name	Date modified	Туре	Size
🕼 7_13_2022 10_56_03 A_A4D57843DED30000 _streaming.csv	7/13/2022 12:56 PM	Microsoft Excel C	76 KB
🕼 A4D57843DED30000_Ch_Z_transmit_LowDutyCycle.csv	7/13/2022 11:35 AM	Microsoft Excel C	68 KB
A4D57843DED30000_Ch_Z_Transmit_Math_LowDutyCycle.txt	7/13/2022 11:34 AM	Text Document	235 KB
A4D57843DED30000_Streaming mode burst_Transmit_Math_Mode.txt	7/13/2022 12:56 PM	Text Document	1 KB

All the measurement data will be saved in a CSV file while the Math results will be backed up in a Txt file.

							Sign i	n 📼			A4D57843DED30000_Streaming mode burst_Transmit_Math_Mode.txt - Notepad —
File Home Insert Page I	avout Formulas	Data R	Review N	View Hele	n O Tel	I me what vo	u want to do			Q Share	File Edit Format View Help
						,,.		00	100 A	/+	Start Date;End Date;Ch_Z_Min value date;Ch_Z_Min value;Ch_Z_Max value date;Ch_Z_Max value;Ch_Z_Average valu
🔥 💑 Calibri - 11	• A* A* = =	- 87 - M	역 ~ 문	General	- (i) Co	onditional For	rmatting *	Sim Insert *	2 - 2*	-	13///2022 11:56:3,20;13///2022 11:56:33,20;//13/2022 12:56:40 PM ;-0.887;//13/2022 12:56:39 PM;-0.828;-0.85
ste B - B - T - H	A		P3 -	\$ - %	* 📝 Fo	rmat as Table	e-	Delete -	• 👽 - 🔎	-	
* * BIY'	. <u>.</u> . = =		E *	0 -0 -00	💱 Ce	ell Styles -		🐑 Format -	1 - C		
lipboard 12 Font	6	Alignment		G Number	6	Styles		Cells	Editing		
POSSIBLE DATA LOSS Some feat preserve ti	ures might be lost if yo hese features, save it in	ou save this wo an Excel file fo	orkbook in ti format.	he comma-de	elimited (.csv	i) format. To	Don	't show again	Save	As X	
u ∗i×√.	fe Device type :	:AX-3D;Meas	sure Mode	:Streaming	g mode bur	st;Time ref	erence :7/1	3/2022 10:5	6:03 AM .02	10; •	
ABC	DE	F	G	н	1.1	J	к	L	м	N	
Device type :AX-3D;Measure Mi	ode :Streaming mod	de burst;Tim	ne referenc	ce :7/13/202	22 10:56:03	AM .020; Sa	ampling rate	e :100;Data	acquisition	cycle :60	
TimeStamp;MeasureCh Z(g);Ch	X(g);Ch Y(g);										
0;-0.852;-0.006;-0.003											
1:-0.854:-0.001:0.001											
2:-0.859:0.006:-0.002											
3:-0.860:-0.003:-0.003											
4:-0.859:-0.001:0.000											
5:-0.859:-0.004:0.000											
6:-0.863:0.000:-0.002											
0 7:-0.856:0.000:-0.003											
1 8:-0.855:0.004:0.001											
2 9:-0.851:0.000:0.000											
3 10:-0 858:-0 001:0 001											
4 11:-0.850:-0.001:0.001											
5 12:-0.854:-0.001:-0.002											
5 12-0 849-0 002-0 000											
7 14:-0 859:0 006:0 004											
8 15:0 841:0 004:0 010											
9 16:-0.856:-0.003:-0.004											
0 17-0 845-0 004-0 002											
1 18-0 866-0 001-0 001											
19:-0.855:0.001:0.000											
3 20:-0.843:-0.003:-0.004											
4 21:-0.861:0.001:0.000											
5 22:-0 854:0 003:0 002											
6 23:-0 848:-0 007:-0 001											
7 24-0.855-0.001-0.001											
8 25:-0.845:0.001:-0.004											
9 26-0 949-0 010-0 001											
0 27:-0 862:0 004:0 002											
1 28:-0.857:0.001:-0.001											
2 29:-0.859:0.001:-0.005											
2 20-0 251-0 001-0 001											
4 11:0 257:0 001:0 005											
5 22 0 951 0 0010 000											
5 22-0.861/0.001/0.000											
34, 0.043, 0.007, 0.003											
7_13_2022 10_56_0	3 A_A4D57843DE	+									<
							100 CH10	(111)			



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#### 2.3.5 Publish Options (Read the measurements)

#### 2.3.5.1 Example with Static DAQ mode

#### 2.3.5.1.1 Topic Name configuration

From the same **configuration** tab, navigate to **Publish\_Info** section, and enter the topic name for static measurement mode (LowDutyCycle & Alarm).

Publish_Info	Subscription Subscription status:	Enabled	
Topic A4D57843E0360000/OTAC	Topic Name:	A4D57843E0360000/OTAC	

#### 2.3.5.1.2 MAC ID Configuration

Then Enter the BeanDevice MAC-ID, you can copy it from the BeanScape software



#### 2.3.5.1.3 BeanDevice Platform Selection

Select the corresponding BeanDevice platform.

Device type	✓ AX_3D
	AX_3DS
	HI_INC_BI
Data acq .mode	HI_INC_MONO
	X_INC_BI
	X_INC_MONO

#### 2.3.5.1.4 Data Acquisition Configuration

Then select the data acquisition mode. (Low Duty Cycle in this case)

	Stop
Data acq .mode	✓ LowDutyCycle
	Alarm
	Streaming
Data any such No	S.E.T
Data acq cycle/No	Sock Detection



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 hours
 minutes
 Seconds

 Data acq cycle/Notif cycle
 00
 :
 00
 :
 10
 HH:MM:SS

Then enter the transmit ratio and Math notification ratio



## 2.3.5.1.5 <u>Current Configuration on the BeanScape Software</u>

Go to the BeanScape software and check the current acquisition, you must have the exact same configuration entered from the LabView toolkit.









#### 2.3.5.1.6 Stop Data Acquisition

If you want to stop the Data Acquisition just go back to the toolkit interface and change the data acquisition mode to stop, Then the BeanDevice will be stopped.

	Publish_Inf								
Topic	A4D57843	E0360000/OTAC							
Mac Id	Mac Id A4D57843E0360000								
Device	type	AX_3D	$\nabla$						
Data acq	.mode	Stop	$\nabla$						



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#### 2.3.5.2 Example with Dynamic Measurement Mode (Streaming)

## 2.3.5.2.1 Topic Name configuration

From the same **configuration** tab, navigate to **Publish\_Info** section, and enter the topic name for dynamic measurement mode (Streaming/SET/Shock detection).



#### 2.3.5.2.2 MAC ID Configuration

Then Enter the BeanDevice MAC-ID, you can copy it from the BeanScape software



### 2.3.5.2.3 BeanDevice Platform Selection

Select the corresponding BeanDevice platform.



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Device type	✓ AX_3D
	AX_3DS
	HI_INC_BI
Data acq .mode	HI_INC_MONO
	X_INC_BI
	X_INC_MONO

## 2.3.5.2.4 Data Acquisition Configuration

Then select the data acquisition mode. (Streaming in this case)

	Stop
Device type	LowDutyCycle
	Alarm
Data acq .mode	✓ Streaming
	S.E.T
	Sock Detection

Choose a sampling rate from the list

Tx ratio	
1.4 14110	√
	10 Hz
Math notif vatio	16 Hz
Math noth ratio	20 Hz
	25 Hz
Sampling rate	32 Hz
5amping rate	40 Hz
	50 Hz
	64 Hz
Data Acq du	80 Hz
-	100 Hz
	125 Hz
	160 Hz
Descett	200 Hz
Dad obtio	250 Hz
	320 Hz
	400 Hz
Stuceming	500 Hz
streaming o	800 Hz
	1000 Hz
	1600 Hz
Store and forwar	2000 Hz



	"Rethinking sensing technology"	Document version: 1.0
BeanAir	Document Type: Technical Note Reference: TN-RF-27	BeanDevice® Wilow - Using MQTT with LabVIEW

Choose the DAQ option

Daq options	Tx Only <ul> <li>Tx Only</li> </ul>	Log Only	Tx&Log	SA O
-------------	-------------------------------------	----------	--------	---------

Select the Streaming option



## 2.3.5.2.5 <u>Current Configuration on the BeanScape Software</u>

Go to the BeanScape software and check the current acquisition, you must have the exact same configuration entered from the LabView toolkit.

Current data acquisition mode				
DAQ Status :	Started			
Data Acq. mode :	Streaming Continuous			
Data Acq. cycle :	NA ddd, hh:mm:ss			
TX_Ratio:	NA			
Sampling Rate:	500 Hz			
Data Acq. duration :	Continue ddd, hh:mm:ss			
	Tx Log			
	0 0			







### 2.3.5.2.6 Stop Data Acquisition

If you want to stop the Data Acquisition just go back to the toolkit interface and change the data acquisition mode to stop, Then the BeanDevice will be stopped.



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### 2.3.5.3 Example with Dynamic Measurement Mode (SET)

## 2.3.5.3.1 Topic Name configuration

From the same **configuration** tab, navigate to **Publish\_Info** section, and enter the topic name for dynamic measurement mode (Streaming/SET/Shock detection).



#### 2.3.5.3.2 MAC ID Configuration

Then Enter the BeanDevice MAC-ID, you can copy it from the BeanScape software



### 2.3.5.3.3 BeanDevice Platform Selection

Select the corresponding BeanDevice platform.



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Reference: TN	I-RF-27
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Device type	✓ AX_3D
	AX_3DS
	HI_INC_BI
Data acq .mode	HI_INC_MONO
	X_INC_BI
	X_INC_MONO

## 2.3.5.3.4 Data Acquisition Configuration

Then select the data acquisition mode. (Streaming in this case)



Enter the data acquisition cycle

	hours	1	minut	es	Second	ls
Data acq cycle/Notif cycle	00	:	05	:	00	HH:MM:SS

Choose a sampling rate from the list

Math notif ratio	√ 10 Hz
	16 Hz
Come Para anda	20 Hz
Sampling rate	25 Hz
	32 Hz
	40 Hz
Data Acq du	50 Hz
•	64 Hz
	80 Hz
	100 Hz
<b>D</b> (1	125 Hz
Daq opti	160 Hz
	200 Hz



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	Reference: TN-RF-27				

#### Enter the data acquisition duration

	hours minutes Seconds					ls
Data Acq duration	00	:	00	:	45	HH:MM:SS

#### Select the data acquisition option



#### 2.3.5.3.5 Current Configuration on the BeanScape Software

Go to the BeanScape software and check the current acquisition, you must have the exact same configuration entered from the LabView toolkit.









#### 2.3.5.3.6 Stop Data Acquisition

If you want to stop the Data Acquisition just go back to the toolkit interface and change the data acquisition mode to stop, Then the BeanDevice will be stopped.

		Publis	h_Info
Topic	A4D57843	E0360000/OTAC	
Mac Id	A4D57843	E0360000	
Device	type	AX_3D	$\nabla$
Data acq	.mode	Stop	$\nabla$
	-		



	"Rethinking sensing technology"	Document version: 1.0		
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## 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 <sup>®</sup> products line	MQTT Communication Protocol for a seamless integration into a third-party IOT software
<u>TN RF 005 «Building a reliable Wi-Fi</u> network with Wilow sensors»	Wilow <sup>®</sup> products line	The aim of this document is to describe the autonomy performance of the BeanDevice <sup>®</sup> SmartSensor <sup>®</sup> and ProcessSensor <sup>®</sup> product line in streaming and streaming packet mode.
UM RF 007 «UM-RF-07-ENG-Wilow- Wifi-Sensor»	Wilow <sup>®</sup> products line	BeanDevice <sup>®</sup> Wilow <sup>®</sup> user manual



How to use the LabVIEW MQTT toolkit

