



## Rethinking Sensing Technology

*Overview of Math Result Feature for Willow (Wireless IIOT sensors)*

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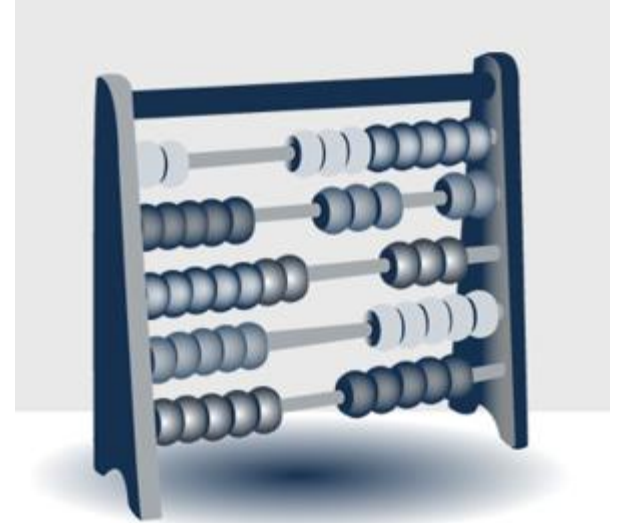
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**23/10/2019**



NEW BEANSCAPE FEATURE

# MATH RESULT





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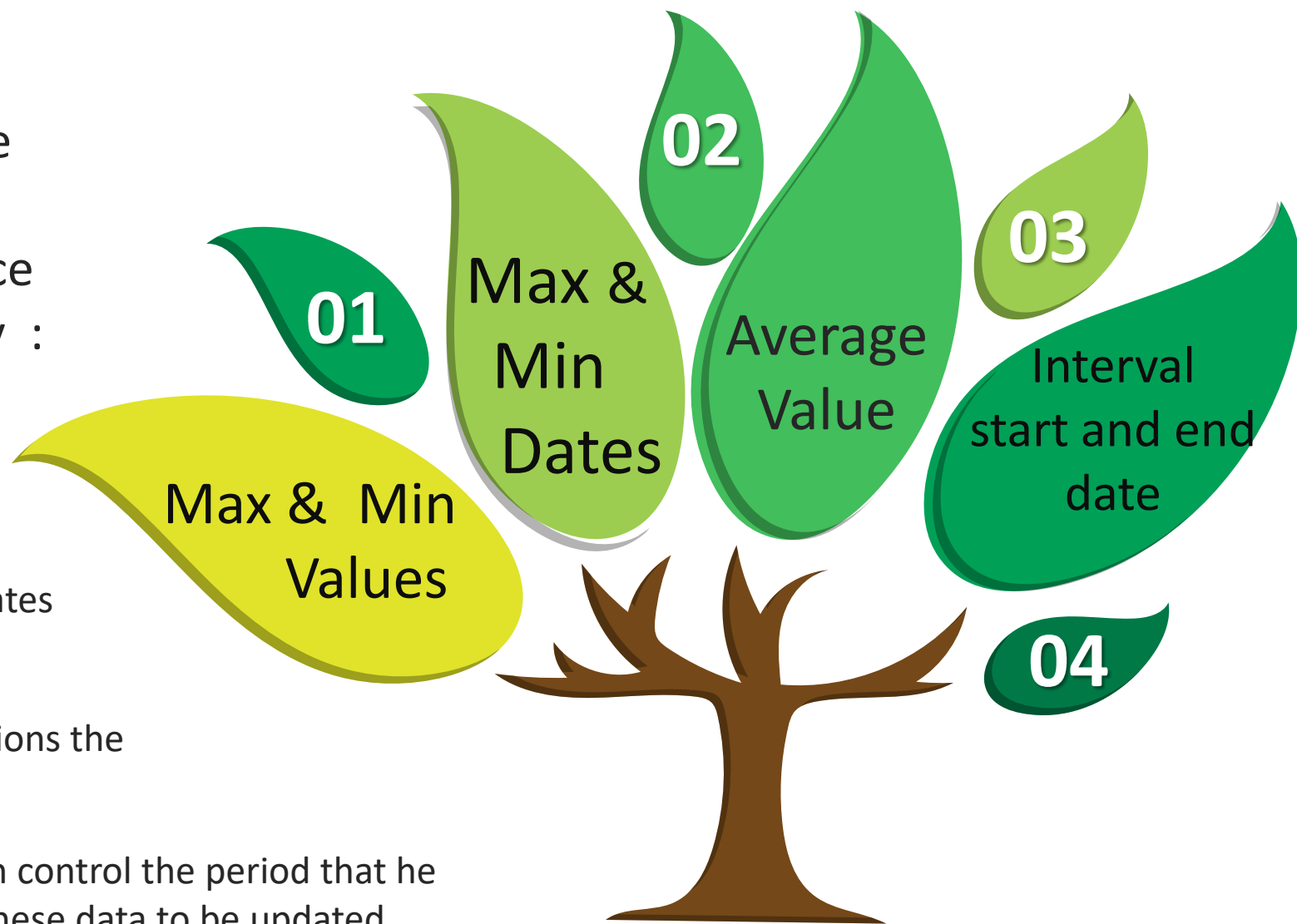
**MATH RESULT LOG FILE**



# 1 WHAT IS MATH RESULT?

Math RESULT is a new feature integrated in Beanscape, it offers a better user experience and a better data handling by :

- Receiving informations about the maximum, minimum & average data values as well as the corresponding dates of their aquisition.
- Receiving informations the average value.
- The user can control the period that he wishes for these data to be updated





# 1 WHAT IS MATH RESULT?



Math Results is included starting from :

Device firmware V3R6

Beanscape Wilow Basic 3.0.2.10

Beanscape Wilow Lite 3.0.2.10

Beanscape Wilow Manager 3.0.1.11

Beanscape Wilow Premium 3.1.0.9

Beanscape Wilow RA 3.2.0.12



# 2 MATH RESULT CONFIGURATIONS

Currently math Result is only available in LowDutyCycle mode

The screenshot shows the BeanScope software interface for configuring a Wilow@ BeanDevice. The main profile displays various system parameters:

- Identity:** Mac Id: C4BE8474DF60000, SSID: Teltonika\_Router, IP Addr: 192.168.1.41, Label: MAC\_ID : 0 x C4BE84747
- Version:** HW Version: V2R0, SW Version: V3R6
- DAQCapability:** Max SR: 2000 Hz, Max TX\_Ratio: 9
- Power Supply Diagnostic:** Temperature: 29 °C, Power supply: Mains, Power mode: active, Battery voltage: 4.174 V, Battery level: Good, DiagDate: 10/11/2019 3:02:33
- Network Diagnostic:** Network quality: 46.04 %
- BeanDevice:** Platform: AX 3D
- DataLogger:** Status: MEMORY EMPTY, Full Mem. Mngmt: STOP\_KEEP\_DAQ
- Current data acquisition mode:** DAQ Status: Started, Data Acq. mode: LowDutyCycle, Data Acq. cycle: 00:00:01, TX Ratio: 1, Sampling rate: NA Hz, Math Notif. ratio: 2, Math Notif. cycle: 00:00:01

The **Data acquisition mode configuration** window is highlighted, showing the following settings:

- Data Acq. mode: LowDutyCycle
- Data Acq. cycle: 00:00:10
- TX\_Ratio: 1
- Math Notif. ratio: 2
- Math Notif. cycle will be: 00:00:10 hh:mm:ss
- Data acquisition mode options:  Tx Only,  Log Only,  Tx & Log
- Streaming Packet Options:  Continuous Monitoring,  Burst,  One Shot
- Store and Forward:  SF Enabled, Data Aging: 30



# 2 MATH RESULT CONFIGURATIONS

Time needed to acquire one data in s



Number of data to be acquired



Number of cycles acquired to start calculation



Time required to provide calculations



**Math Notif Cycle in this case is 10**

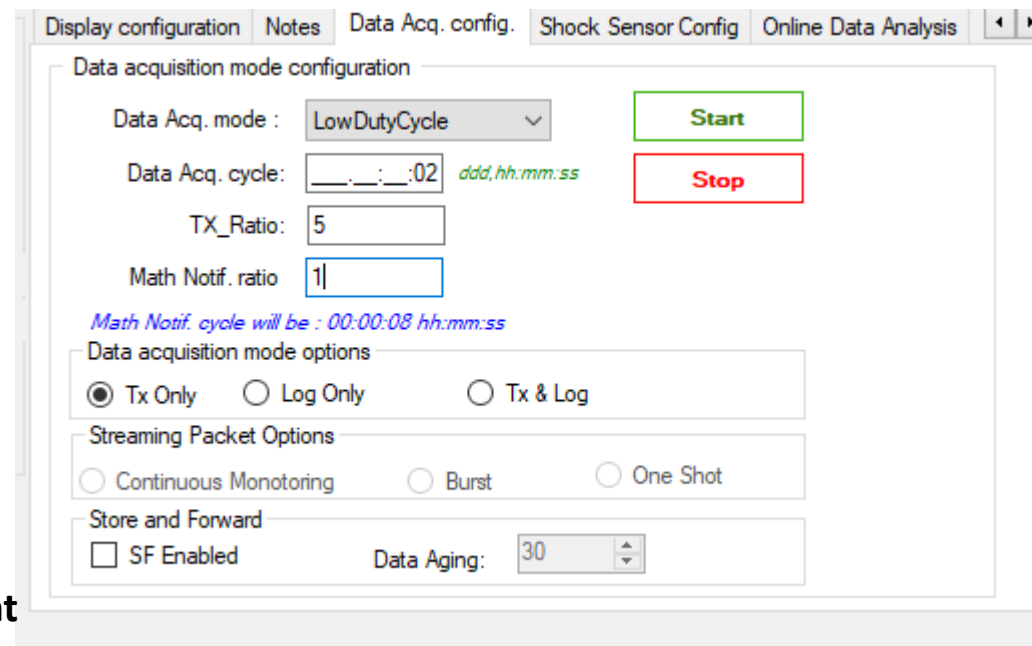
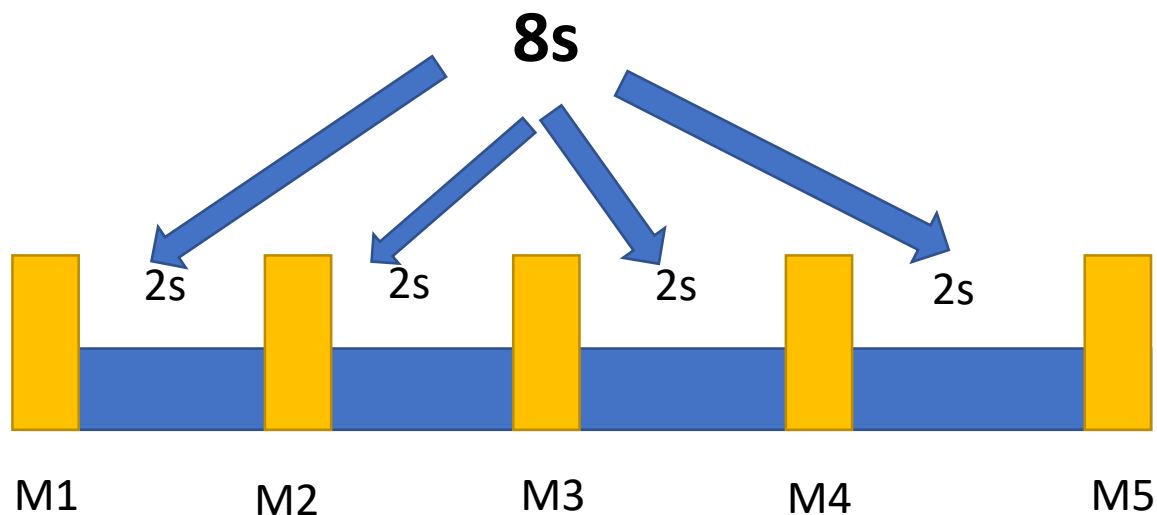
$$\begin{aligned}
 \text{Math Notif Cycle} &= (\text{Data Acq Cycle} \times \text{Tx\_Ratio} \times \text{Math.NotifRatio}) - \text{Data Acq.cycle} \\
 &= (10 \times 1 \times 2) - 10 = 20 - 10 = 10
 \end{aligned}$$



# 2 MATH RESULT CONFIGURATIONS

*Not clear yet?*

*Let's explain more with an other example*



Data Acq cycle =2 seconds: so every two seconds we will receive a measurement

TX =5 so we will need 5 data to be sent

Math Notif Cycle is the time needed to acquire the Results

$$\text{Math Notif Cycle} = (\text{Data Acq Cycle} \times \text{Tx\_Ratio} \times \text{Math.NotifRation}) - \text{Data Acq.cycle}$$

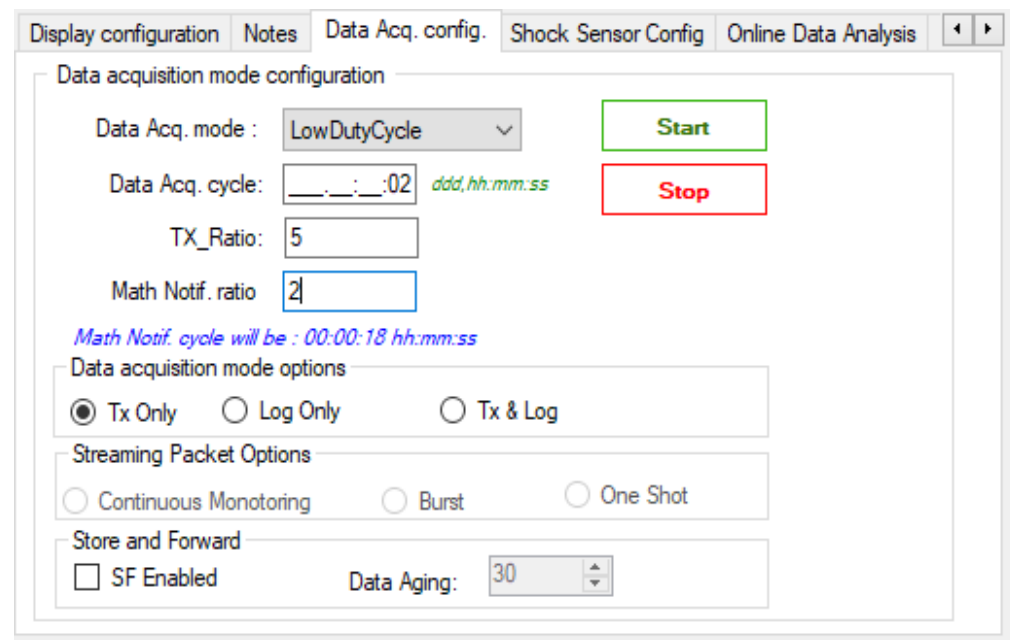
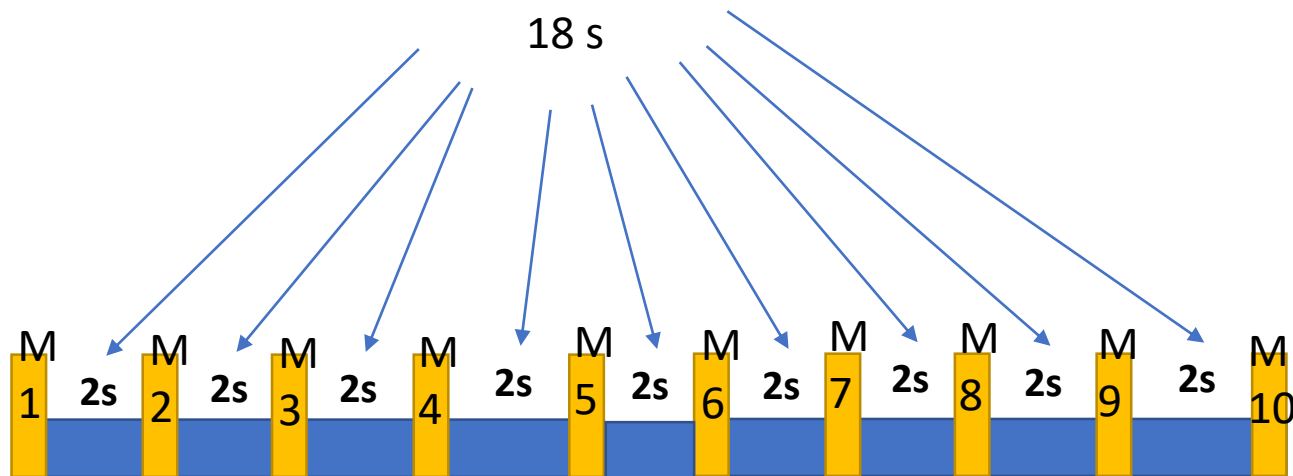
$$\text{Math Notif Cycle} = (2 * 5 * 1) - 2 = 8$$





# 2 MATH RESULT CONFIGURATIONS

*Let's explain more with an other example*



Data Acq cycle =2 seconds: so every two seconds we will receive a measurement

TX =5 so we will need 5 data to be sent

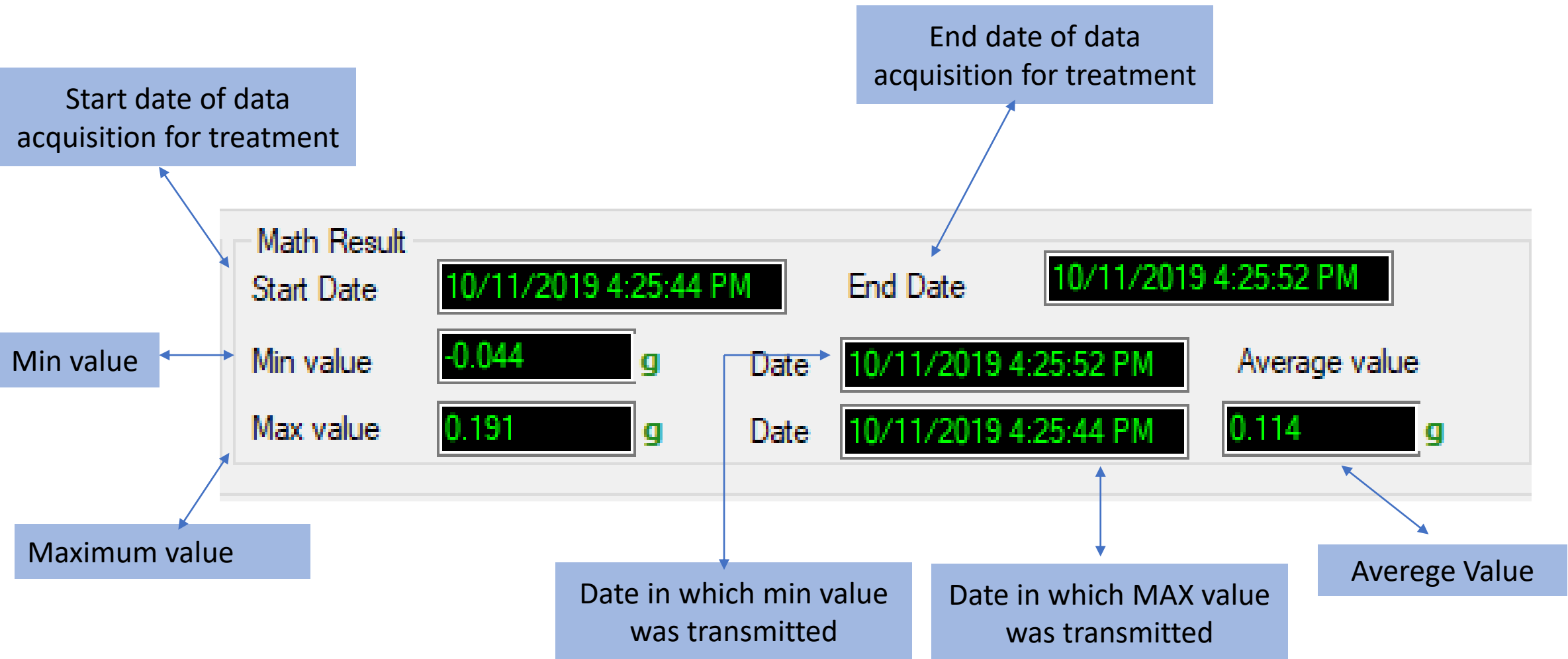
Math not ration =2 so Tx\_Ration will be multiplied by 2 = 10 Measurements

**Math Notif Cycle =( Data Acq Cycle × Tx\_Ratio × Math.NotifRation) – Data Acq.cycle**

**Math Notif Cycle=(2\*5\*2) – 2=18**



# 3 MATH RESULT DISPLAY





After setting the configurations

Display configuration Notes Data Acq. config. Shock Sensor Config Online

Data acquisition mode configuration

Data Acq. mode :

Data Acq. cycle:  *ddd,hh:mm:ss*

TX\_Ratio:

Math Notif. ratio

*Math Notif. cycle will be : 00:00:05 hh:mm:ss*

Data acquisition mode options

```

BeanDevice : AX 3D
PAN_ID : FFFE
MAC_ID : C4BE84747DF60000
Network Id : 0129
Measure mode : LowDutyCycle
DATE_FORMAT : M/d/yyyy h:mm:ss tt
Date : 10/14/2019 12:16:35 PM
Unit for accelerometer : g
Math Notif. ratio : 2
Math Notif. cycle 00:00:05 ddd,hh:mm:ss
-----

```



```

Date_start;Date_end | Ch_Z(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average | Ch_X(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average | Ch_Y(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average
-----
10/14/2019 10:16:30 AM;10/14/2019 10:16:35 AM | 10/14/2019
10:16:30 AM;0.8;10/14/2019 10:16:35 AM;0.802;0.801 | 10/14/2019
10:16:30 AM;0.02;10/14/2019 10:16:35 AM;0.021;0.02 | 10/14/2019
10:16:35 AM;-0.005;10/14/2019 10:16:30 AM;-0.003;-0.004
10/14/2019 10:16:40 AM;10/14/2019 10:16:45 AM | 10/14/2019
10:16:45 AM;0.802;10/14/2019 10:16:40 AM;0.809;0.805 |
10/14/2019 10:16:40 AM;0.013;10/14/2019 10:16:45 AM;0.014;0.013
| 10/14/2019 10:16:40 AM;-0.01;10/14/2019 10:16:45
AM;-0.006;-0.008
10/14/2019 10:16:50 AM;10/14/2019 10:16:55 AM | 10/14/2019
10:16:55 AM;0.794;10/14/2019 10:16:50 AM;0.802;0.798 |
10/14/2019 10:16:55 AM;0.015;10/14/2019 10:16:50 AM;0.017;0.016
| 10/14/2019 10:16:55 AM;-0.008;10/14/2019 10:16:50
AM;-0.006;-0.007
10/14/2019 10:17:00 AM;10/14/2019 10:17:05 AM | 10/14/2019
10:17:05 AM;0.804;10/14/2019 10:17:00 AM;0.808;0.806 |
10/14/2019 10:17:05 AM;0.016;10/14/2019 10:17:00 AM;0.017;0.016
| 10/14/2019 10:17:05 AM;-0.01;10/14/2019 10:17:00
AM;-0.005;-0.007
10/14/2019 10:17:10 AM;10/14/2019 10:17:15 AM | 10/14/2019
10:17:15 AM;0.802;10/14/2019 10:17:10 AM;0.803;0.802 |
10/14/2019 10:17:10 AM;0.01;10/14/2019 10:17:15 AM;0.015;0.012 |
10/14/2019 10:17:15 AM;-0.011;10/14/2019 10:17:10
AM;-0.009;-0.01
10/14/2019 10:17:20 AM;10/14/2019 10:17:25 AM | 10/14/2019
10:17:25 AM;0.801;10/14/2019 10:17:20 AM;0.802;0.801 |
10/14/2019 10:17:25 AM;0.011;10/14/2019 10:17:20 AM;0.013;0.012
| 10/14/2019 10:17:25 AM;-0.008;10/14/2019 10:17:20

```

Math RESULT file is as created besides the Tx file

This PC > Windows (C:) > log\_beanscape > Folder C4BE84747DF60000 > TX Folder

Name	Date modified	Type	Size
 Transmit_Allsensor_LowDutyCycle_C4BE84747DF60000_Ch_Z_Ch_X_Ch_Y_10_14_2019_10...	10/14/2019 12:19 PM	Text Document	2 KB
 Transmit_Allsensor_MathResultLowDutyCycle_MAC_ID__0_x_C4BE84747DF60000_Ch_Z...	10/14/2019 12:19 PM	Text Document	5 KB



# 3 MATH RESULT LOG FILE

The header of the MathRESULT file contains the details about the sensor as well as the :

Math Notif ration  
& calculated Math Notif cycle

```
BeanDevice : AX 3D  
PAN_ID : FFFE  
MAC_ID : C4BE84747DF60000  
Network Id : 0129  
Measure mode : LowDutyCycle  
DATE_FORMAT : M/d/yyyy h:mm:ss tt  
Date : 10/14/2019 12:16:35 PM  
Unit for accelerometer : g  
Math Notif. ratio : 2  
Math Notif. cycle 00:00:05 ddd, hh:mm:ss
```



The body of the file contains the period of acquisition,

The Max, Min values with their corresponding dates & the average Value on each channel X Y Z

```
Date_start;Date_end | Ch_Z(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average | Ch_X(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average | Ch_Y(g)
Date_Min;Value_Min;Date_Max;Value_Max;Average
```

Chanel X fo example

- Min Value & date
- Max Value & date
- Average

```
10/14/2019 10:16:30 AM;10/14/2019 10:16:35 AM | 10/14/2019
10:16:30 AM;0.8;10/14/2019 10:16:35 AM;0.802;0.801 | 10/14/2019
10:16:30 AM;0.02;10/14/2019 10:16:35 AM;0.021;0.02 | 10/14/2019
10:16:35 AM;0.005;10/14/2019 10:16:35 AM;0.005;0.005
```



**Rethinking Sensing Technology**

*Thank you  
Please feel free to contact us on our email  
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