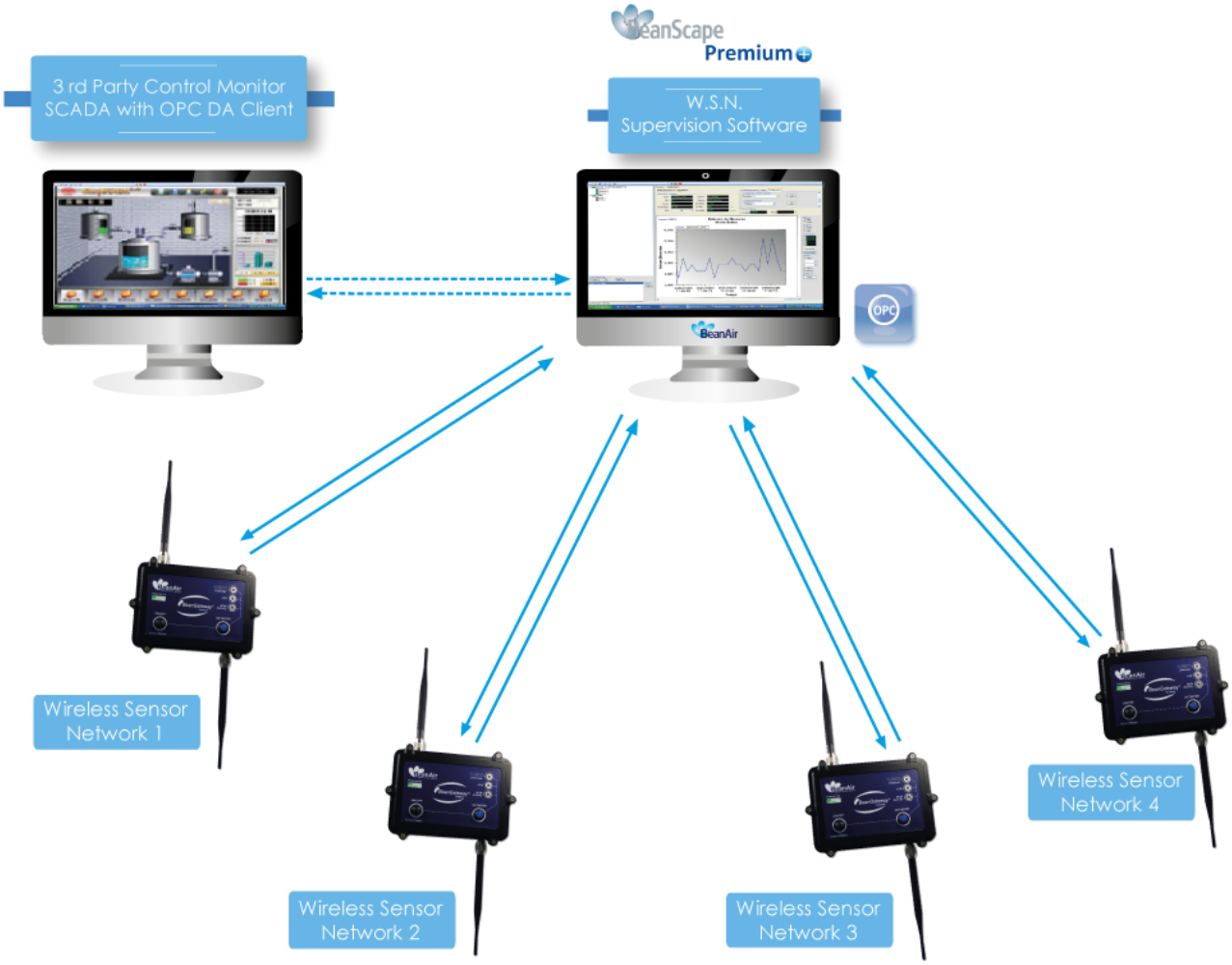
BeanAir

Version 1.6.1

USER MANUAL

OPC Server add-on (BeanScape® Premium+)



BeanAir

Rethinking Sensing Technology

2.4 GHz

DOCUMENT			
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Author	Fahd ESSID, Embedded Software Engineer		
Internal Reference		**Project Code**	
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Function	**Recipients**	**For Validation**	**For information**
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MAILING LIST			
Function	**Recipients**	**For action**	**For Info**
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Staffer 2	Christophe DONTEGREUIL		X

Updates			
Version	**Date**	**Author**	**Evolution & Status**
1.3.3	06/07/2012	Maneli PARSY	• **"VT_BEAN_PLATFORM_TYPE" added**
1.3.5	28/11/2014	Mohamed Yosri Jaouadi	• **Burst mode, Oneshot mode and Commissioning Mode command inserted**
1.4	20/01/2015	Mohamed Yosri Jaouadi	• **Datalogger full memory strategy commands inserted**
1.5	10/01/2016	Mohamed Yosri Jaouadi	• **« VT_Acknowledgement » added** • **« VT_DownloadStatus » added** • **« VT_LoggerStatus » added**
1.6	20/12/2018	Fahd Essid	• **Chart update** • **Screenshots update** • **Vocabulary update** • **OTAC commands update** • **Commissioning timeout command deleted** • **OPC DA Client source code added**
1.6.1	09/05/2019	Mohamed Bechir Besbes	• **Weblinks Update**

Contents

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1. TECHNICAL SUPPORT

For general contact, technical support, to report documentation errors and to order manuals, contact ***Beanair Technical Support Center*** (BTSC) at:
tech-support@Beanair.com

For detailed information about where you can buy the Beanair equipment/software or for recommendations on accessories and components visit:

www.Beanair.com

To register for product news and announcements or for product questions contact Beanair's Technical Support Center (BTSC).

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

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. 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
SSD	Smart shock detection
WSN	Wireless sensor Network

4. RELATED DOCUMENTS

In addition to this ***User Manual***, please consult the application notes & technical notes mentioned below:

4.1 APPLICATION NOTES

Document name (Click on the weblink)	Related product	Description
AN_RF_007 :" Beanair_WSN_Deployment"	All BeanAir products	Wireless sensor networks deployment guidelines
AN_RF_006 – „How to extend your wireless range"	All BeanAir products	A guideline very useful for extending your wireless range
AN_RF_005 – BeanGateway ® & Data Terminal Equipment Interface	BeanGateway ®	DTE interface Architecture on the BeanGateway ®
AN_RF_003 - "IEEE 802.15.4 2.4 GHz Vs 868 MHz"	All BeanAir products	Comparison between 868 MHz frequency band and a 2.4 GHz frequency band.
AN_RF_002 – "Structural Health monitoring on bridges"	All BeanAir products	The aim of this document is to overview Beanair® products suited for bridge monitoring, their deployment, as well as their capacity and limits by overviewing various Data acquisition modes available on each BeanDevice®.

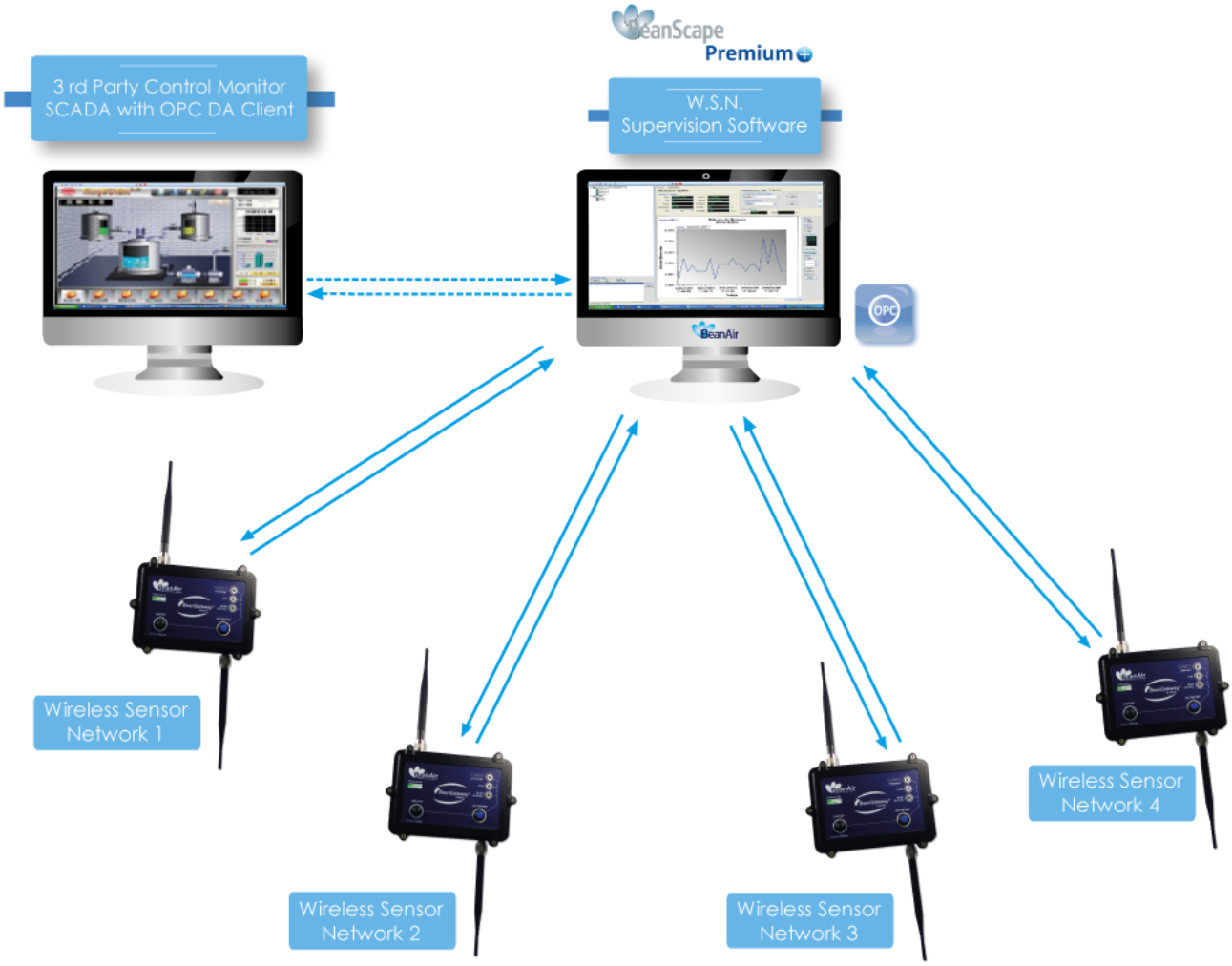
4.2 TECHNICAL NOTES

Document name (Click on the weblink)	Related product	Description
TN_RF_013 – « OPC configuration »	BeanScape® Premium+	The aim of this document is to help deploying the OPC DA and all associated services.
TN_RF_012– « BeanDevice® battery life in streaming mode »	All the products	The aim of this document is to describe the autonomy performance of the BeanDevice® SmartSensor® and ProcessSensor® product line in streaming packet mode.
TN_RF_011 – « Coexistence of Beanair WSN at 2.4GHz »	All the products	This document aims to highlight the issues affecting co-existence of Beanair WSN (IEEE 802.15.4) in the presence of interference.
TN_RF_010 – « BeanDevice® Power Management »	All the BeanDevice®	This technical note describes the sleeping & active power mode on the BeanDevice®.
TN_RF_009 – « BeanGateway ® management on LAN infrastructure »	BeanGateway ®	BeanGateway ® integration on a LAN infrastructure
TN_RF_008 – "Data acquisition modes available on the BeanDevice®"	All the BeanDevice®	Data acquisition modes available on the BeanDevice®
TN_RF_007 – "BeanDevice® DataLogger User Guide "	All the BeanDevice®	This document presents the DataLogger feature on the BeanDevice®
TN_RF_006 – "WSN Association process"	All the BeanDevice®	Description of the BeanDevice® network association
TN_RF_005 – "Pulse counter & binary Data acquisition on the BeanDevice® SUN-BN"	BeanDevice® SUN-BN	This document presents Pulse counter (ex: energy metering application) and binary Data acquisition features on the BeanDevice® SUN-BN.
RF_TN_003- "Aggregation capacity of wireless sensor networks"	All the products	Network capacity characterization of Beanair Wireless Sensor Networks
RF_TN_002 V1.0 - Current consumption in active & sleeping mode	BeanDevice®	Current consumption estimation of the BeanDevice in active and sleeping mode
RF_TN_001 V1.0- Wireless range benchmarking	BeanDevice®	Wireless range benchmarking of the BeanDevice®

5. GENERAL OVERVIEW

5.1 BEANSCAPE PREMIUM+ BLOCK DIAGRAM

The BeanScape® Premium+ OPC DA, integrates an OPC DA server (Data Access).



5.2 SERVICE OPC DA (DATA ACCESS)

The OPC DA (Data Access) is particularly well suited for real time measurement and data sharing. Each data/ measurement can be associated to a tag or its attributes and shared with one or many OPC clients. Hence the ***BeanScape® Premium+*** opens up to many third party applications (SCADA, web portals etc ...).

Note that the ***BeanScape® Premium+*** OPC is DA 2, DA 2.5 and DA 3 compliant.

Before installing the BeanScape® Premium+ make sure that you have already downloaded and installed « OPC Core Components » (redistributable). You can download it from https://www.opcfoundation.org.

Also read the BeanScape® manual carefully before going through the OPC manual.

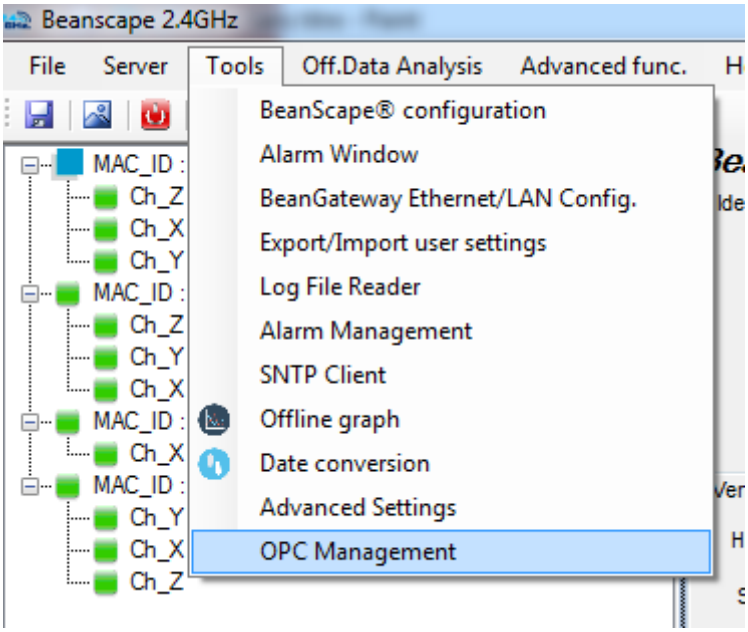
The OPC is available under the following operating modes:

Data Acquisition mode	*Data Transmission through OPC DA Channel*
Marker	***Yes***
LowDutyCycle	***Yes***
Survey	***Yes***
Streaming Packet	***Yes (new feature)***
SSD	***Yes (new feature)***

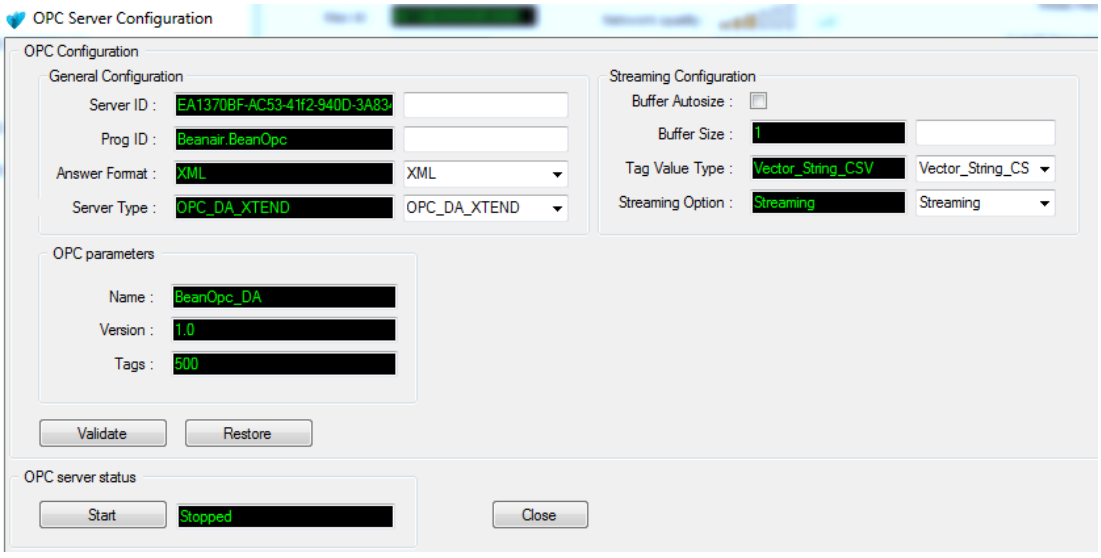
6. CONFIGURATION AND LAUNCHING OF THE OPC SERVER FROM THE GUI

6.1 OPC TAB ACCESS

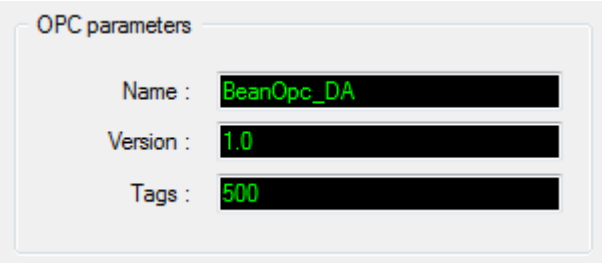
To start the OPC Server on BeanScape®, you should go to **Tool** on the main menu bar and select **OPC Management**



The OPC Server Configuration window will be displayed.



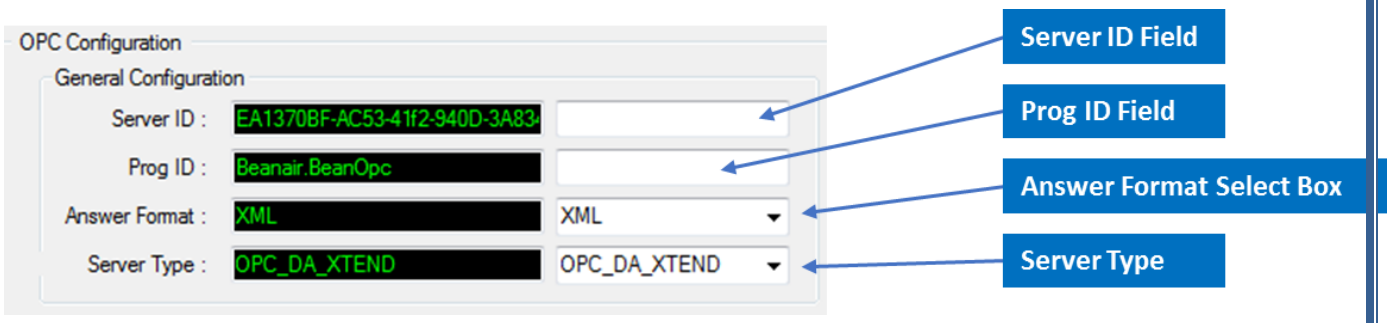
6.2 OPC PARAMETERS



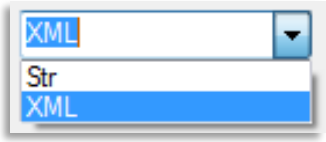
On the OPC Server Configuration you will see the OPC parameters related to your server:

- ***Name*** : OPC DA name
- ***Version*** : Indicates the OPC DA version
- *Tags* : Indicates the maximum number of tags available on the OPC DA server.

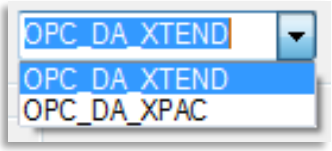
6.2.1 General Configuration



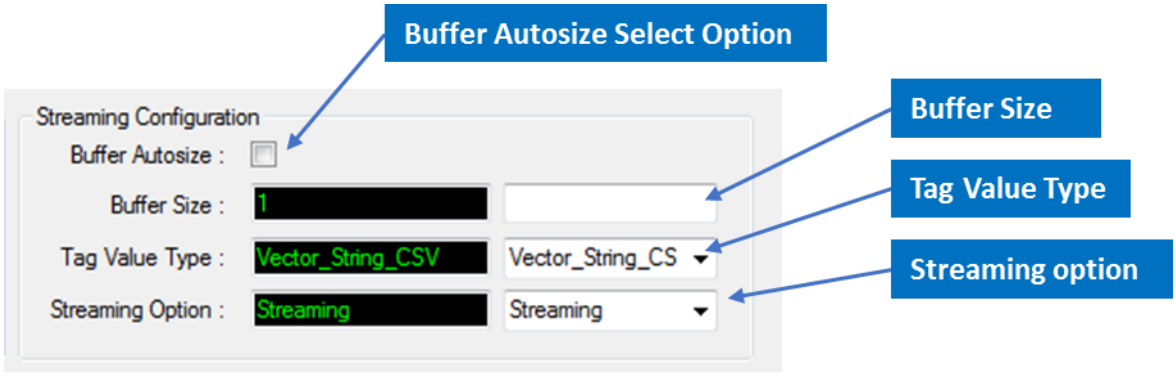
- ✓ ***Server ID*** : The server ID is a single identifier dedicated to the OPC DA service. For those who are more familiar with COM programming, this identifier is also called the "**CLSID**" . The "**CLSID**" is made up of 36 characters where each character is represented by "X" and is of alphanumeric type. { XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXX }
- ✓ ***Prog ID*** : The prog ID is an alias dedicated to the server ID. The "**Prog ID**" will be visible to OPC DA clients. Its maximum size is limited to 50 characters, and its minimum size to 4 characters. Each character is of alphanumeric type that contains « . » as separator.
- ✓ ***Answer Format***: The response format is associated to the response messages sent following the execution of any command from the "Command" tag(cf. sec 3.3.6 and chap. 4). The XML option allows the writing of response messages in XML format and the « **Str** » does the same but in plain text (cf. sec 3.3.6 et chap. 4).



✓ ***Server Type*** : The server type can be chosen between the two following values "**OPC_DA_XTEND**" and "**OPC_DA_XPAC**".

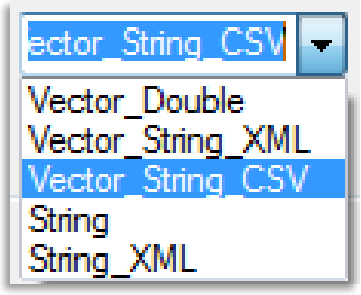


6.2.2 Streaming Configuration



✓ ***Buffer Size***: The buffer size equals the amount of measurement values that will be set into the tag/item buffer. Each time the amount of transmitted observations exceeds the buffer size, then all data are sent to the item/tag and its value (Double[],String[]..) refreshed. If the Buffer Size AutoSize checkbox is checked then the buffer size will be automatically set to the sampling frequency for each and every sensor.

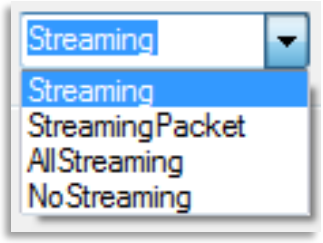
✓ ***Tag Value Type***: the tag value type can be set by selecting the desired value from the drop down select box containing the following options "**Vector_Double**", "**Vector_String_XML**", "**Vector_String_CSV**", "**String, String_XML**"



Option Name	Type	Value
Vector_Double	Double[]	For each row: Row Value = Measurement value in Double Ex 1,34
Vector_String_XML	String[]	For each row: Row Value = <Record Value="value"> <Date> date</Date> </Record> Ex: <Record Value="1"> <Date> 2012-07-03T11:52:28.9889096Z</Date> </Record>
Vector_String_CSV,	String[]	For each row: Row Value = Measurement value in String = "Value,Date,Millisecond,Ticks,Index" Ex: 1,23;11:47:47;689;634769128676898202;123232322333
String	String	Measurement value in String = <Value1,Date1,Millisecond1,Ticks1,Index1> <Value2,Date2,Millisecond2,Ticks2,Index2> …<Value3,Date3,Millisecond3,Ticks3,Index3> Ex: <1;12:14:07;173;634769144471731615;123232322333>… <2,45;12:14:07;174;634769144471731616;123232322334>…. <-21;12:14:07;174;634769144471731616;123232322334>….
String_XML	string	Measurement value in String = <Record Value="value1"> <Date> date1</Date> </Record> <Record Value="value2"> <Date>2 date2</Date> </Record> . . <Record Value="value_n"> <Date>2 date_n</Date> </Record>

		Ex: <Record Value="13"> <Date> 2012-07-03T11:52:28.9889096Z</Date> </Record> <Record Value="-10,5"> <Date> 2012-07-03T11:52:29.9889097Z</Date> </Record> . . <Record Value="-0,23"> <Date> 2012-07-03T12:00:00.98890909X</Date> </Record>.

- ***Streaming Option***: The user can select the streaming option from the drop down select box containing the following options "**StreamingPacket**", "**AllStreaming**", "**NoStreaming**".



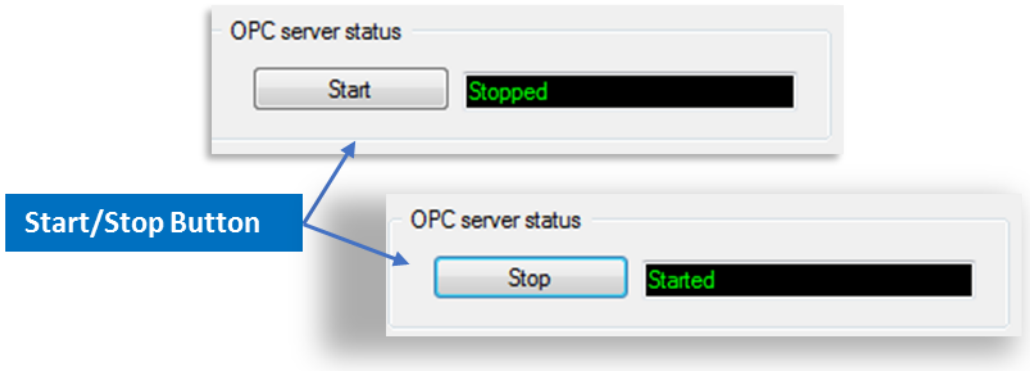
in any case if the SSD mode is selected the device will be transmitting data through the Streaming tag.

Option	*If Selected*
StreamingPacket	The Streaming tag will be only dedicated to **StreamingPacket mode** and **SSD** transmission
AllStreaming	The Streaming tag will be only dedicated to **StreamingPacket mode** and **SSD** transmission
NoStreaming	**StreamingPacket** modes will be deactivated on all tags (**SSD** will remain activated)

To validate the previous configuration or to reset all values, you have access Validate/Restore buttons :

- ***Validate button***: Validates all input fields « Server ID » and « Prog ID » together with the response format select box through a right click. All input fields left empty will not be impacted.
- ***Restore button***: Resets all input fields « Server ID » and « Prog ID » together with the response to their initial factory settings.

6.3 START AND STOP THE OPC SERVER



- ***Start the OPC DA server***: Click on the start button, the server estate will then switch on to «Started», the DA OPC server is launched.

- ***Stopping the OPC DA server***: Click on the stop button: the server estate will then switch on to «Stopped», the DA OPC server is stopped.

7. DETAILED DATA DESCRIPTION

The OPCA DA splits into two distinct versions, the **OPC DA XPAC** and **OPC DA XTEND.** These two versions differ by the way they display data (items/attributes).

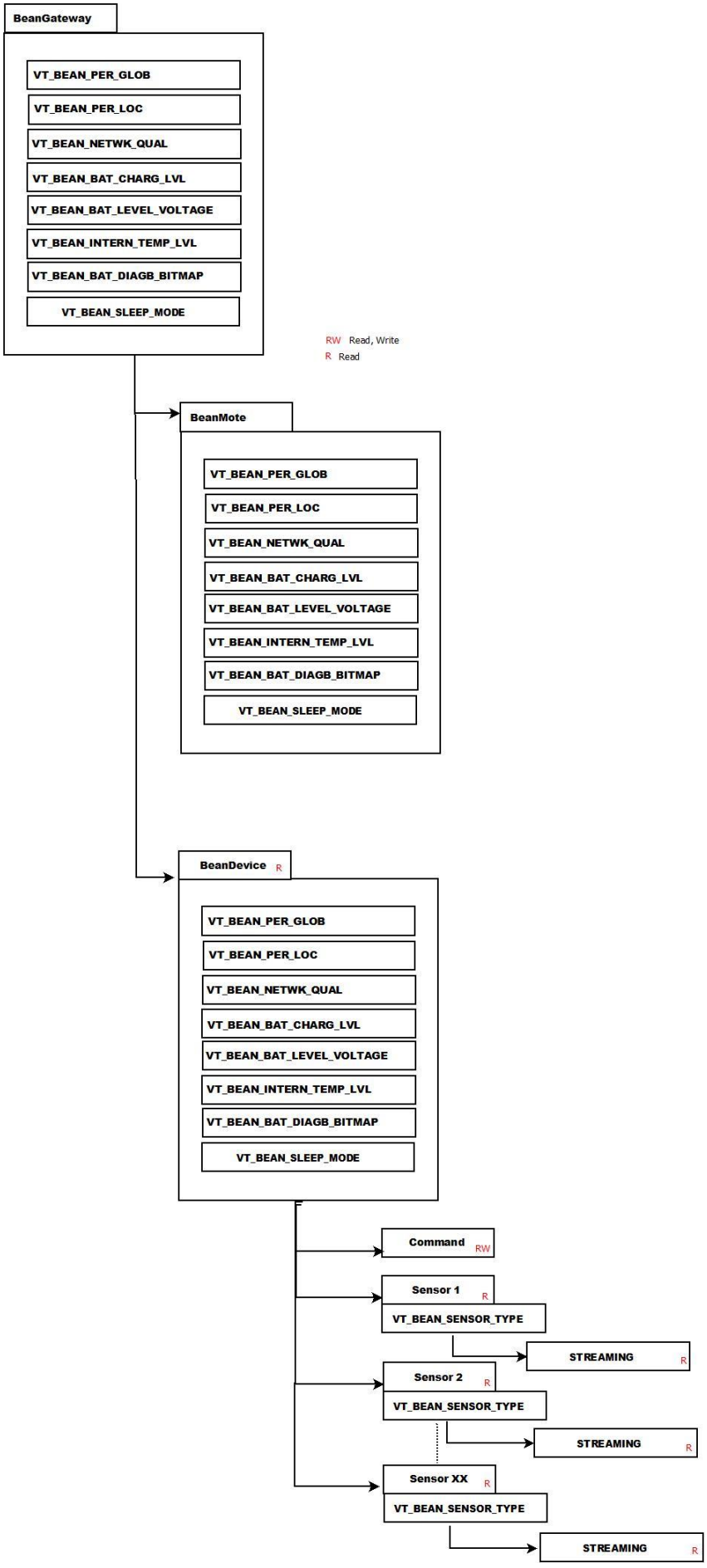
Name	*OPC DA XPAC*			*OPC DA XTEND*		
	Attribute ID	Attribute ID	Item/Tag	Attribute ID	Attribute ID	Item/Tag
VT_BEAN_NETWK_QUAL	5001	YES	NO	NC*	NO	YES
VT_BEAN_PER_GLOB	5002	YES	NO	NC*	NO	YES
VT_BEAN_PER_LOC	5003	YES	NO	NC*	NO	YES
VT_BEAN_BAT_LEVEL_VOLTAGE	5004	YES	NO	NC*	NO	YES
VT_BEAN_BAT_CHARG_LVL	5005	YES	NO	NC*	NO	YES
VT_BEAN_BAT_DIAG_BITMAP	5006	YES	NC**	NC*	NO	NC**
VT_BEAN_INTERN_TEMP_LVL	5007	YES	NO	NC*	NO	YES
VT_BEAN_NETWK_DIAG_SEND_FREQ	5008	YES	NC**	NC*	NO	NC**
VT_BEAN_SENSOR_TYPE	5009	YES	NO	NC*	NO	YES
VT_BEAN_SLEEP_MODE	5010	YES	NO	NC*	NO	YES
VT_BEAN_PLATFORM_TYPE	5011	YES	NO	NC*	NO	YES
VT_Acknowledgement	1001	YES	NO	NC*	NO	YES
VT_DownloadStatus	1002	YES	NO	NC*	NO	YES
VT_DataloggerStatus	1003	YES	NO	NC*	NO	YES

NC*=Not concerned

NC**=Not Concerned/ Not implemented

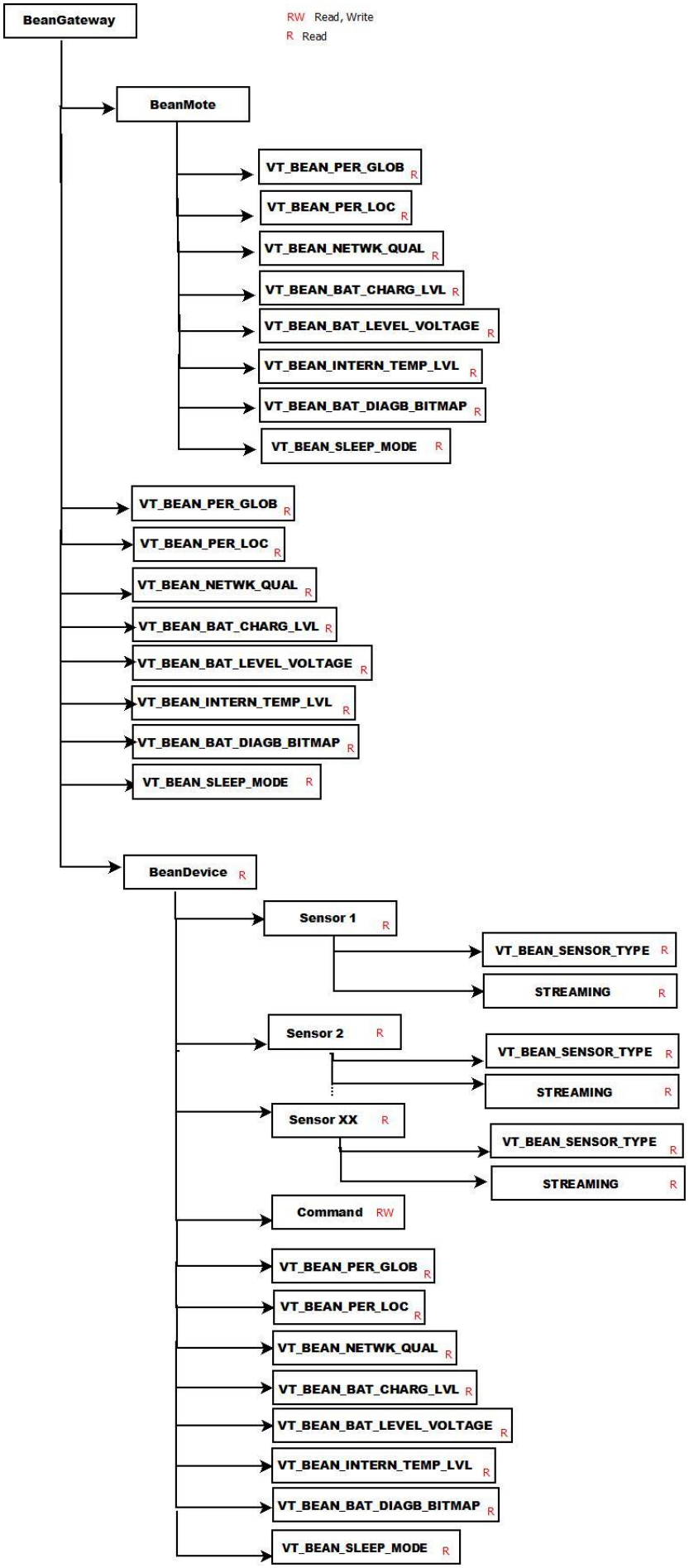
7.1 DATA TREE PRESENTATION: OPC DA XPAC

The **OPC DA XPAC** version represents data under a rather compact data tree which complies to the below drawing. All items bearing the « R » quote are only accessible in read mode. All other items bearing the « RW » quote are accessible in “Read and “Write” mode.


BeanGateway
VT_BEAN_PER_GLOB
VT_BEAN_PER_LOC
VT_BEAN_NETWK_QUAL
VT_BEAN_BAT_CHARG_LVL
VT_BEAN_BAT_LEVEL_VOLTAGE
VT_BEAN_INTERN_TEMP_LVL
VT_BEAN_BAT_DIAGB_BITMAP
VT_BEAN_SLEEP_MODE
RW Read, Write
R Read
BeanMote
VT_BEAN_PER_GLOB
VT_BEAN_PER_LOC
VT_BEAN_NETWK_QUAL
VT_BEAN_BAT_CHARG_LVL
VT_BEAN_BAT_LEVEL_VOLTAGE
VT_BEAN_INTERN_TEMP_LVL
VT_BEAN_BAT_DIAGB_BITMAP
VT_BEAN_SLEEP_MODE
BeanDevice R
VT_BEAN_PER_GLOB
VT_BEAN_PER_LOC
VT_BEAN_NETWK_QUAL
VT_BEAN_BAT_CHARG_LVL
VT_BEAN_BAT_LEVEL_VOLTAGE
VT_BEAN_INTERN_TEMP_LVL
VT_BEAN_BAT_DIAGB_BITMAP
VT_BEAN_SLEEP_MODE
Command RW
Sensor 1 R
VT_BEAN_SENSOR_TYPE
STREAMING R
Sensor 2 R
VT_BEAN_SENSOR_TYPE
STREAMING R
Sensor XX R
VT_BEAN_SENSOR_TYPE
STREAMING R

7.2 DATA TREE PRESENTATION: OPC DA XTEND

The DA XTEND version represents data under a rather extended data tree which complies to the below drawing. All items bearing the « R » quote are only accessible in read mode. All other items bearing the « RW » quote are accessible in “Read” and “Write” mode.


BeanGateway
RW Read, Write
R Read
BeanMote
VT_BEAN_PER_GLOB R
VT_BEAN_PER_LOC R
VT_BEAN_NETWK_QUAL R
VT_BEAN_BAT_CHARG_LVL R
VT_BEAN_BAT_LEVEL_VOLTAGE R
VT_BEAN_INTERN_TEMP_LVL R
VT_BEAN_BAT_DIAGB_BITMAP R
VT_BEAN_SLEEP_MODE R
VT_BEAN_PER_GLOB R
VT_BEAN_PER_LOC R
VT_BEAN_NETWK_QUAL R
VT_BEAN_BAT_CHARG_LVL R
VT_BEAN_BAT_LEVEL_VOLTAGE R
VT_BEAN_INTERN_TEMP_LVL R
VT_BEAN_BAT_DIAGB_BITMAP R
VT_BEAN_SLEEP_MODE R
BeanDevice R
Sensor 1 R
VT_BEAN_SENSOR_TYPE R
STREAMING R
Sensor 2 R
VT_BEAN_SENSOR_TYPE R
STREAMING R
Sensor XX R
VT_BEAN_SENSOR_TYPE R
STREAMING R
Command RW
VT_BEAN_PER_GLOB R
VT_BEAN_PER_LOC R
VT_BEAN_NETWK_QUAL R
VT_BEAN_BAT_CHARG_LVL R
VT_BEAN_BAT_LEVEL_VOLTAGE R
VT_BEAN_INTERN_TEMP_LVL R
VT_BEAN_BAT_DIAGB_BITMAP R
VT_BEAN_SLEEP_MODE R

7.3 DATA RELATED TO THE BEANDEVICE

7.3.1 "BeanDevice®" Item/Tag

The following table defines the data acquisition modes applied to all subcomponents which are the sensors.

OPC Name	Value Formatting	Description	Access Right
"DEVICE_"+<PanIdHex>+<MacIdHex>	Byte (unsigned byte) Mode Marker = 0x11 Mode Survey = 0x23	BeanDevice	Read Only (R)

Given the below information:

Gateway_Name="GATEWAY_"+<PanIdHex>

Device_Name=<OPC_Name>

Separator="."

The OPC path determination is as follows:

Address = <Gateway_Name>+<Separator>+<Device_Name>

7.3.2 Sleep Mode/Power Mode attribute OPC DA XPAC

OPC Name	Dynamic/Value	Description	ID Attribut
"VT_BEAN_SLEEP_MODE"	Byte SLEEP_MODE_DISABLED = 0x10 SLEEP_MODE_ENABLED = 0x20 SLEEP_MODE_LISTENING_ENABLED = 0x40 SLEEP_MODE_POWER_OFF = 0x80	Sleep Mode/Power Mode "Sleep Mode"	5010

7.3.3 Sleep Mode/Power Mode Tag/Item OPC DA XTEND

OPC Name	Dynamic/Value	Description	Access Right
"VT_BEAN_SLEEP_MODE"	Byte SLEEP_MODE_DISABLED = 0x10 SLEEP_MODE_ENABLED = 0x20 SLEEP_MODE_LISTENING_ENABLED = 0x40 SLEEP_MODE_POWER_OFF = 0x80	Sleep Mode/Power Mode "Sleep Mode"	Read Only (R)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>
Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>+<Separator>+<OPC_Name>
```

7.3.4 Diagnostic Attributes: OPC DA XPAC

OPC Name	*Value Formatting*	*Description*	*Attribute ID*
"VT_BEAN_PER_GLOB"	Float (0 à 10 000 pts)	"Global PER"	5002
"VT_BEAN_PER_LOC"	Float (0 à 10 000 pts)	"Local PER"	5004
"VT_BEAN_NETWK_QUAL"	Uint (0 à 255 pts)	"Network Quality"	5001
"VT_BEAN_BAT_CHARG_LVL"	Float (0 à 10 000 pts)	"Battery Charge Level"	5005
"VT_BEAN_BAT_LEVEL_VOLTAGE"	Float	Tension de la batterie en mV "Battery Voltage Level in mV",	5004
"VT_BEAN_INTERN_TEMP_LVL"	Float	"Battery Internal Temperature"	5007
"VT_BEAN_BAT_DIAGB_BITMAP"	Byte Disable Discharge 0x04 Disable Charge 0x08 Discharge Over Current 0x10 Charge Over Current 0x20 UnderVoltage 0x40 OverVoltage 0x80	"Battery Diagnostic Bitmap"	5006

7.3.5 The Platform Type Attribute OPC D

7.3.6 A XPAC

OPC Name	Value Formatting	Description	Attribute ID
"VT_BEAN_PLATFORM_TYPE"	Byte None = 0, AN_4_20_mA = 0x01; AN_V = 0x02; AN_mV = 0x03; TOR = 0x04; AHD_420 = 0x05; AHD_V = 0x06; AHD_mV = 0x07; AX_3D = 0x10; HPI_2D = 0x11; AX_HD = 0x13; TSI = 0x21; TIR = 0x22; TH = 0x23; SUN_T = 0x24; SUN_IR = 0x25; SUN_TOR = 0x26; SUN_TH = 0x27; SUN = 0x28; SUN_LEVEL = 0x29; TECH_AX_IN = 0x29; TECH_AX_3D_S = 0x2A; TECH_GYR_3D_S = 0x2B;	Sleep Mode/Power Mode "Sleep Mode"	5010

7.3.7 The Platform Type Tag/Item OPC DA XTEND

OPC Name	Value Formatting	Description	Access Right
"VT_BEAN_PLATFORM_TYPE"	Byte None = 0, AN_4_20_mA = 0x01; AN_V = 0x02; AN_mV = 0x03; TOR = 0x04; AHD_420 = 0x05; AHD_V = 0x06; AHD_mV = 0x07; AX_3D = 0x10; HPI_2D = 0x11; AX_HD = 0x13; TSI = 0x21; TIR = 0x22; TH = 0x23; SUN_T = 0x24; SUN_IR = 0x25; SUN_TOR = 0x26; SUN_TH = 0x27; SUN = 0x28; SUN_LEVEL = 0x29; TECH_AX_IN = 0x29;	Sleep Mode/Power Mode "Sleep Mode"	Read Only (R)

	TECH_AX_3D_S = 0x2A; TECH_GYR_3D_S = 0x2B;		

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>
Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>+<Separator>+<OPC_Name>
```

7.3.8 The acknowledgement Tag/Item

This Item represent an information about the last Configuration sent status.

OPC Name	Dynamic/Value	Description	ID Attribut
"VT_Acknowledgement"	Byte CONFIG_MSG_IN_BUFFER = 0x01 CONFIG_MSG_SENT= 0x20 CONFIG_MSG_DELETED_= 0x03 CONFIG_MSG_UNDEFINED= 0x04	Last command status	1001

7.3.9 DownloadStatus Item/Tag

OPC Name	Dynamic/Value	Description	ID Attribut
"VT_DownloadStatus"	Byte NONE = 0x00 ANY_DATA_TODOWNLOAD= 0x01 DOWNLOAD_PROCESSING_= 0x02 DOWNLOAD_COMPLETED= 0x03 DOWNLOAD_CANCELLING= 0x04 DOWNLOAD_CANCELLED= 0x05 DOWNLOAD_TIMEOUT= 0x06 DOWNLOAD_FAILURE= 0x07	Download status	1002

7.3.10 LoggerStatus Item/Tag

OPC Name	Dynamic/Value	Description	ID Attribut
"VT_LoggerStatus"	Byte LOGGER_INITIALIZING = 0x00 LOGGER_READY = 0x01 LOGGER_ACTIVE = 0x02 LOGGER_STOPPED = 0x03 LOGGER_FAILURE = 0x04 LOGGER_NOT_INITIALIZED = 0x05 LOGGER_STOPPEDFULLMEM = 0x06 LOGGER_STAND_ALONE= 0x40	DataLogger Status	1003

7.3.11 Diagnostic Items/Tags: OPC DA XTEND

This table shows all the diagnostics related to the BeanDevice®:

OPC Name	Value Formatting	Description	Access Right
"VT_BEAN_PER_GLOB"	Float (0 à 10 000 pts)	"Global PER"	Read Only (R)
"VT_BEAN_PER_LOC"	Float (0 à 10 000 pts)	"Local PER"	Read Only (R)
"VT_BEAN_NETWK_QUAL"	Uint (0 à 255 pts)	"Network Quality"	Read Only (R)
"VT_BEAN_BAT_CHARG_LVL"	Float (0 à 10 000 pts)	"Battery Charge Level"	Read Only (R)
"VT_BEAN_BAT_LEVEL_VOLTAGE"	Float	"Battery Voltage Level in mV",	Read Only (R)
"VT_BEAN_INTERN_TEMP_LVL"	Float	"Battery Internal Temperature"	Read Only (R)
"VT_BEAN_BAT_DIAGB_BITMAP"	Byte Disable Discharge 0x04 Disable Charge 0x08 Discharge Over Current 0x10 Charge Over Current 0x20 UnderVoltage 0x40 OverVoltage 0x80	Diagnostic Batterie "Battery Diagnostic Bitmap"	Read Only (R)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name=<OPC_Name>
Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>
```

7.3.11.1 How to convert and display the diagnostics data

Global Packet Error Rate: Units in % (precision: 3 digits after decimal comma)

PER_Global_% = PER_Global_Nb_Pts/100

Local Packet Error Rate: Units in % (precision: 3 digits after decimal comma)

PER_Local_% = PER_Local_Nb_Pts/100

Radio signal quality : Units in LQI (Link Quality Indicator)

No conversion

Battery Charge level : Units in % (precision: 3 digits after decimal comma)

Charge_Lvl% = Charge_Lvl _Nb_Pts/100

Battery Voltage : Units in Volts (precision: 3 digits after decimal comma)

Voltage = 4,88 * voltage_Nb_points/1000

Internal Temperature : Units in °C (precision: 3 digits after decimal comma)

Temp_°C = 0,125 * Temp_Nb_points/1000

7.3.12 The « Command » Item/Tag

OPC Name	Value Formatting	Description	Access Right
"Command"	String	Command chain described below	Read,Write (R,W)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>
Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>+<Separator>+<OPC_Name>
```

Generic commands related to measure mode change:

The available commands are the following:

```
SetMeasureMode measureMode measureCycle measureDuration measureFrequency

SetMeasureMode_Survey measureCycle measureDuration
  Ex: SetMeasureMode_Survey 001,10:10:20 001,00:00:20
SetMeasureMode_LowDutyCycle measureCycle
  Ex: SetMeasureMode_LowDutyCycle 001,10:10:20
```

Parameter	Description
measureMode	Value can be as follwoing: "LowDutyCycle" "Alarm" "Paquet_One_Shot" "Paquet" "Math_One_Shot" "Math" "Logger" "Telemetry" "Tracking_Alarm" "Streaming" "Streaming_Alarm" "Survey"
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
measureDuration	Value expressed in Seconds
measureFrequency	Valeur in Hz Indicates the sensor sampling rate

7.4 DATA RELATED TO THE SENSOR

7.4.1 "STREAMING" Item/Tag

The "Streaming" TAG provides data related to streaming and SSD data transmission modes. Whenever a device is switched to "**Streaming Packet"** or **"SSD"** mode the Streaming tag/item is updated given the chosen data format and size (see section 2.3 OPC configuration).

OPC Name	Value Formatting	Description	Access Right
"Streaming"	Vector_Double Vector_String_XML Vector_String_CSV String String_XML (for more detail refer to section 2.3)	Streaming	Read only (R)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>

Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>

Sensor_Name=<Gateway_Name>+<Separator>+<Device_Name>+<Separator

Separator="."
```

The OPC path determination is as follows:

```
Address=
Sensor_Name+"SENSOR_"+<SensIdPrimHex>+"SENSOR_"+<SensIdPrimHex>+<OPC_Name>
```

7.4.2 "BEANSENSOR" Item/Tag

The BeanSensor® technically provides data measurement as well as other information.

OPC Name	Value Formatting	Description	Access Right
"SENSOR_"+<SensIdPrimHex>	Double In case of the padlock proceded to the below rule. Rule: In order to obtain a bitmap, procede to unsigned Byte Conversion	BeanSensor	Read only (R)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>
Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>+<Separator>+<OPC_Name>
```

7.4.3 « Type » attribute: OPC DA XPAC

The Beansensor type is communicated through the «VT_BEAN_SENSOR_TYPE » attribute associated to each « Beansnsor ».

OPC Name	*Value Formatting*	*Description*	*Attribute ID*
"VT_BEAN_SENSOR_TYPE"	byte AN_4_20_mA = 0x01; AN_V =0x02; AN_mV =0x03; INT_TEMP =0x04; AX_3D =0x05; HPI_2D = 0x06; AX_HD = 0x07; AHD_420 =0x08; AHD_V =0x09; AHD_mV =0x0A; TSI =0x0F; TOR =0x15; CADENAS =0x16;	Sensor technology	5009

7.4.4 « Type » Item/Tag: OPC DA XTEND

The Beansensor type is communicated through the «VT_BEAN_SENSOR_TYPE » Item/Tag associated to each « Beansnsor ».

OPC Name	*Value Formatting*	*Description*	*Access Right*
"VT_BEAN_SENSOR_TYPE"	Byte AN_4_20_mA = 0x01; AN_V =0x02; AN_mV = 0x03; INT_TEMP = 0x04; AX_3D =0x05; HPI_2D = 0x06; AX_HD = 0x07; AHD_420 = 0x08; AHD_V = 0x09; AHD_mV = 0x0A; TSI = 0x0F; TOR = 0x15; CADENAS = 0x16;	Type technologie du capteur	Lecture Seule (R)

Given the below information:

```
Gateway_Name="GATEWAY_"+<PanIdHex>
Device_Name="GATEWAY_"+<PanIdHex>+<MacIdHex>
Sensor_Name="SENSOR_"+<SensIdPrimHex>

Separator="."
```

The OPC path determination is as follows:

```
Address = <Gateway_Name>+<Separator>+<Device_Name>+<Separator>+< Sensor_Name >+<
Separator >+<OPC_Name>
```

8. DETAILED DESCRIPTION OF BENGATEWAY COMMANDS

The execution of each command from the “Command” item attached to the “BeanGateway” Item leads both to a system response « MasterError » and the writing of a response message on the “Command” Item/Tag under “XML” or “Str” format (Configurable from the GUI).

8.1 SYSTEM ACKNOWLEDGMENT

The « MasterError » is systematically updated after each command execution

Acknowledgment Code	Description
Fail	Command not executed
Ok	Command executed

8.2 COMMANDS FOR CONFIGURING THE GATEWAY

8.2.1 The “SetClockBoradcastCycle” Command

This command sets the broadcasting cycle to the desired value. (refer to the Beanscape® user manual).

8.2.1.1 Command Syntax

```
SetClockBoradcastCycle clockBroadcastingCycle
  Ex: SetClockBoradcastCycle 20
```

Parameters	Description
clockBroadcastingCycle	Value type (UInt32) Min Value=0 Max Value= (refer to the Beanscape® user manual)

8.2.1.2 *Response Syntax*

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

8.2.2 The "SetNetwkDiagCycle" Command

This command sets the network diagnostics cycle to the desired value. (refer to the Beanscape® user manual).

8.2.2.1 *Command Syntax*

```
SetNetwkDiagCycle networkDiagCycleConf
  Ex: SetNetwkDiagCycle 120
```

Parameters	Description
networkDiagCycleConf	Value type (UInt32) Min Value=0 Max Value= (refer to the Beanscape® user manual)

8.2.2.2 *Response Syntax*

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

8.2.3 The "SetTxPowerConfig" Command

This command sets the power configuration to the desired value. (refer to the Beanscape® user manual).

8.2.3.1 *Command Syntax*

```
SetTxPowerConfig networkDiagCycleConf
  Ex: SetNetwkDiagCycle 0
```

Parameters	Description
networkDiagCycleConf	Value type (UInt32) Min Value = 0 Max Value= 5 Mapping: 0 = -7 dBm 1 = -1 dBm 2 = +5 dBm 3 = +11 dBm 4 = +15 dBm 5 = +18 dBm

Response Syntax

Response Parameter	***Parameter***	***Description***
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

8.2.4 The "EraseGatewayNetworkContext" Command

This command erases the BeanGateway®'s network context. (refer to the Beanscape® user manual).

8.2.4.1 Command Syntax

```
EraseGatewayNetworkContext networkDiagCycleConf
  Ex: EraseGatewayNetworkContext 0
```

Parameters	Description
clockBroadcastingCycle	Value type (UInt16) Min Value = 0 Max Value= 1 Mapping: 0 = Configuration Reset ("Carto") 1 = Profile Reset ("Full")

Response Syntax

Response Parameter	***Parameter***	***Description***
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9. DETAILED DESCRIPTION OF BEANDEVICE COMMANDS

The execution of each command from the “Command” item attached to the “BeanDevice” Item leads both to a system response « MasterError » and the writing of a response message on the “Command” Item/Tag under “XML” or “Str” format (Configurable from the GUI).

9.1 SYSTEM ACKNOWLEDGMENT

The « MasterError » is systematically updated after each command execution

Acknowledgment Code	Description
Fail	Command not executed
Ok	Command executed

9.2 COMMANDS FOR SETTING THE MEASURE MODE

9.2.1 The “SetMeasureMode_Survey” Command

This command sets the sensor measure mode to “Survey” mode. The logger mode will be set to “TX Only” which means that the data will be only transmitted to the gateway and not recorded within the device flash memory (refer the Beanscape user manual).

9.2.1.1 Command Syntax

```
SetMeasureMode_Survey measureCycle measureCycleDuration
  Ex: SetMeasureMode_Survey 000,00:00:10 001,00:00:20
```

Parameters	Description
measureCycle	Date value= “DDD,hh:mm:ss” Min Value=1 Day Max Value=365 Days
measureCycleDuration	Date value= “DDD,hh:mm:ss” Min Value=1 Day Max Value=365 Days

```
Rule :  measureCycleDuration <= measureCycle
          AND
          measureCycleDuration % measureCycle != 0
```

The measurment cycle duration is less or equal to the measure cycle and the measure cycle is a duration acquisition cycle multiple

9.2.1.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.2 The "SetMeasureMode_Survey_WLogger" Command

This command sets the sensor measure mode to "Survey" mode. The logger mode will be set to the desired option.

9.2.2.1 Command Syntax

```
SetMeasureMode_Survey_WLogger measureCycle measureCycleDuration logger_option
  Ex: SetMeasureMode_Survey_WLogger 000,00:00:10 001,00:00:20 2
```

Parameters	Description
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
measureCycleDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

```
Rule :  measureCycleDuration <= measureCycle
        AND
        measureCycleDuration % measureCycle != 0

The measurment cycle duration is lower of equal to the measure cycle and the
measure cycle is a duration acquisition cycle multiple
```

9.2.2.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.3 The "SetMeasureMode_LowDutyCycle" Command

This command sets the sensor measure mode to "LowDutyCycle" mode. The logger mode will be set to "TX Only" which means that the data will be only transmitted to the gateway and not recorded within the device flash memory (refer the Beanscape user manual).

9.2.3.1 Command Syntax

```
SetMeasureMode_LowDutyCycle measureCycle
  Ex: SetMeasureMode_LowDutyCycle 001,10:10:20
```

Parameter	Description
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days

9.2.3.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.4 The "SetMeasureMode_LowDutyCycle_WLogger" Command

This command sets the sensor measure mode to "LowDutyCycle" mode. The logger mode will be set to the desired option.

9.2.4.1 Command Syntax

```
SetMeasureMode_LowDutyCycle_Wlogger measureCycle logger_option
  Ex: SetMeasureMode_LowDutyCycle_WLogger 001,10:10:20 3
```

Parameter	*Description*
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.4.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.5 The "SetMeasureMode_StreamingPacket" Command

This command sets the sensor measure mode to "StreamingPacket" mode. The logger mode will be set to the desired option.

9.2.5.1 Command Syntax

```
SetMeasureMode_StreamingPacket measureFrequency measureCycle
measureCycleDuration logger_option
  Ex: SetMeasureMode_StreamingPacket 1000 000,00:00:10 001,00:00:20 2
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value= see sensor specification
measureCycleDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

```
Rule :  measureCycleDuration <= measureCycle
        AND
        measureCycleDuration % measureCycle != 0

The measurment cycle duration is lower of equal to the measure cycle and the
measure cycle is a duration acquisition cycle multiple
```

9.2.5.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.6 The "SetMeasureMode_StreamingPacket_CntMon" Command

This command sets the sensor measure mode to "StreamingPacket" mode with the continuous streaming mode turned set to "ON". The logger mode will be set to the desired option.

9.2.6.1 Command Syntax

```
SetMeasureMode_StreamingPacket_CntMon measureFrequency logger_option
  Ex: SetMeasureMode_StreamingPacket_CntMon 600 2
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.6.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.7 The "SetMeasureMode_Streaming_CntMon" Command

This command sets the sensor measure mode to "Streaming" mode with the continuous streaming mode set to "ON" . The logger mode will be set to the desired option.

9.2.7.1 Command Syntax

```
SetMeasureMode_Streaming_CntMon measureFrequency logger_option
  Ex: SetMeasureMode_StreamingPacket_CntMon 100 0
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.7.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">

<Request>Str_Request</Request>

<Response ReturnCode="Str_ReturnCode">Str_Response</Response>

</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.8 The "SetMeasureMode_SSD" Command

This command sets the sensor measure mode to "SSD" mode. The logger mode will be set to the desired option.

9.2.8.1 Command Syntax

```
SetMeasureMode_SSD measureFrequency measureCycle measureCycleDuration
logger_option
  Ex: SetMeasureMode_SSD 100 000,00:00:10 001,00:00:20 0
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value= see sensor specification
measureCycleDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

```
Rule :  measureCycleDuration <= measureCycle
        AND
        measureCycleDuration % measureCycle != 0

The measurment cycle duration is lower of equal to the measure cycle and the
measure cycle is a duration acquisition cycle multiple
```

9.2.8.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
 <Request>Str_Request</Request>
 <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.9 The "SetMeasureMode_SSD_CntMon" Command

This command sets the sensor measure mode to "SSD" mode with the continuous streaming mode set to "ON" . The logger mode will be set to the desired option.

9.2.9.1 Command Syntax

```
SetMeasureMode_SSD measureFrequency logger_option
  Ex: SetMeasureMode_SSD 100 0
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.9.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.10 The "SetMeasureMode_StreamingPacket_Burst" Command

This Command set the sensor measure mode to "StreamingPacket" mode and configure the measurement cycle and the measurement duration.

9.2.10.1 Command Syntax

```
SetMeasureMode_StreamingPacket_Burst measureFrequency measureCycle
measureCycleDuration logger_option
  Ex: SetMeasureMode_StreamingPacket_Burst 1000 000,00:00:10 001,00:00:20 2
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value= see sensor specification
measureCycleDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

```
Rule :  measureCycleDuration <= measureCycle
        AND
        measureCycleDuration % measureCycle != 0

The measurment cycle duration is lower of equal to the measure cycle and the
measure cycle is a duration acquisition cycle multiple
```

9.2.10.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.11 The "SetMeasureMode_StreamingPacket_Burst" Command

This Command set the sensor measure mode to "Streaming" mode and configure the measurement cycle , the measurement duration and the datalogger option.

9.2.11.1 Command Syntax

```
SetMeasureMode_Streaming_Burst measureFrequency measureCycle
measureCycleDuration logger_option
  Ex: SetMeasureMode_StreamingPacket_Burst 1000 000,00:00:10 001,00:00:20 2
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz Max Value=100 Hz
measureCycle	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value= see sensor specification
measureCycleDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

Rule : measureCycleDuration <= measureCycle
AND
measureCycleDuration % measureCycle != 0

The measurment cycle duration is lower of equal to the measure cycle and the measure cycle is a duration acquisition cycle multiple

9.2.11.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.12 The "SetMeasureMode_StreamingPacket_OneShot" Command

This Command set the sensor measure mode to "StreamingPacket" mode and configure the measurement duration and the datalogger option.

9.2.12.1 Command Syntax

SetMeasureMode_StreamingPacket_OneShot *measureFrequency MaeasureDuration logger_option*
Ex: SetMeasureMode_StreamingPacket_OneShot 1000 000,00:00:10 2

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz See sensor specificaion
measureDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.12.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.13 The "SetMeasureMode_StreamingPacket_OneShot" Command

This Command set the sensor measure mode to "Streaming" mode and configuring the measurement duration and the datalogger option.

9.2.13.1 Command Syntax

```
SetMeasureMode_Streaming_OneShot measureFrequency MaeasureDuration
logger_option
  Ex: SetMeasureMode_StreamingPacket_OneShot 100 000,00:00:10 2
```

Parameters	Description
measureFrequency	Frequency in Hz Min Value=1 Hz Max Value=100 HZ
measureDuration	Date value= "DDD,hh:mm:ss" Min Value=1 Day Max Value=365 Days
Logger_option	If value is set to "0" then the transmission option will be set to "TX" If value is set to "1" then the transmission option will be set to "Log" If value is set to "2" then the transmission option will be set to "Log&TX" If Else then the transmission option will be set to "TX"

9.2.13.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.2.14 The “SetMeasureMode_Commissioning” Command

This command set the sensor Measure mode to “Commissioning” mode

9.2.14.1 Command Syntax

```
SetMeasureMode_Commissioning Timeout
  Ex: SetMeasureMode_Commissioning 600
```

Parameters	Description
Timeout	Min Value=60 s Max Value=3600 s

9.2.14.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.3 COMMANDS FOR CONFIGURING THE DIGNOSTICS AND TX POWER MODE

9.3.1 The "SetNetwkDiagCycle" command

This command sets the device diagnostics cycles to the desired frequency

9.3.1.1 Command Syntax

```
SetNetwkDiagCycle diagnosticCycle
  Ex: SetNetwkDiagCycle 100
```

Parameters	Description
diagnosticCycle	Frequency (UInt32) Min Value= see device specifications Max Value= see device specifications

9.3.1.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.3.2 The "SetTxPowerConfig" command

This command sets the device power configuration desired option

9.3.2.1 Command Syntax

```
SetTxPowerConfig powerOption
  Ex: SetNetwkDiagCycle 1
```

Parameters	Description
powerOption	Option (Byte) Min Value= 0 Max Value= 5

9.3.2.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.4 LEAVE NETWORK COMMAND

This command issues a “LeaveNetwork” command.

9.4.1.1 Command Syntax

```
LeaveNetwork

Ex: LeaveNetwork
```

9.4.1.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.5 COMMANDS FOR CONFIGURING THE SLEEP MODE

9.5.1 The "SetWaitingFrameDeletion" command

This command issues a "waitFrameDeletion" command.

9.5.1.1 Command Syntax

```
SetWaitingFrameDeletion

Ex: SetWaitingFrameDeletion
```

9.5.1.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.5.2 The "EnableSleepMode" command

This command sets the "Sleep Mode" to "ON".

9.5.2.1 Command Syntax

```
EnableSleepMode

Ex: EnableSleepMode
```

9.5.2.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.5.3 The "DisableSleepMode" command

This command sets the "sleep mode" to "OFF".

9.5.3.1 Command Syntax

```
DisableSleepMode

Ex: DisableSleepMode
```

9.5.3.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.5.4 The "EnableSleepWithListening" command

This command enables the "Sleep Mode" with the listening option turned "ON".

9.5.4.1 Command Syntax

```
EnableSleepWithListening ratio

Ex: EnableSleepWithListening 50
```

Parameters	Description
powerOption	Option (uint16) Min Value= 1 Max Value=100

9.5.4.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6 COMMANDS FOR CONFIGURING THE DATA LOGGER

9.6.1 "Logger_Download_Data" command

This command issues a download request to the device.

9.6.1.1 Command Syntax

```
Logger_Download_Data

Ex: Logger_Download_Data
```

9.6.1.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6.2 "Logger_Stop_Logging_Data" command

This command issues a stop logging command order to the device.

9.6.2.1 Command Syntax

```
Logger_Stop_Logging_Data
Ex: Logger_Stop_Logging_Data
```

9.6.2.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6.3 " Logger_Erase_Stored_Log" command

This command issues an erase stored log command order to the device.

9.6.3.1 Command Syntax

```
Logger_Erase_Stored_Log
Ex: Logger_Erase_Stored_Log
```

9.6.3.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

```
<Message Date="Dt_Date">
  <Request>Str_Request</Request>
  <Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>
```

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6.4 "Logger_Cancel_Upload" command

This command issues a cancel upload stored log request to the device.

9.6.4.1 Command Syntax

```
Logger_Cancel_Upload
Ex: Logger_Cancel_Upload
```

9.6.4.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6.5 DownloadThenErase Command

This command is used to download then erase the logged data.

9.6.5.1 Command Syntax

```
DownloadThenErase
Ex: DownloadThenErase
```

9.6.5.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.6.6 SCDE Command

This command is used to set the DeanDevice in commissioning mode the download logger data then erase logged data .

9.6.6.1 Command Syntax

```
SCDE
Ex: SCDE
```

9.6.6.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.7 DATA LOGGER FULL MEMORY STRATEGY COMMANDS:

9.7.1 "SetFullMemory_SC" command :

This command sets the DtataLogger full memory strategy to "Switch to commissioning".

9.7.1.1 Command Syntax

```
SetFullMemory_SC

Ex: SetFullMemory_SC
```

9.7.1.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.7.2 "SetFullMemory_SAE" command :

This command sets the DtataLogger full memory strategy to "Stop at the end".

9.7.2.1 Command Syntax

```
SetFullMemory_SAE

Ex: SetFullMemory_SAE
```

9.7.2.2 Response Syntax

Response Parameter	Parameter	Description
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

9.7.3 "SetFullMemory_SCDE" command :

This command sets the DtataLogger full memory strategy to "Switch to commissioning, download then erase".

9.7.3.1 Command Syntax

```
SetFullMemory_SCDE

Ex: SetFullMemory_SCDE
```

9.7.3.2 Response Syntax

Response Parameter	*Parameter*	*Description*
Return Code	Str_ReturnCode	Return Code • « OK » if command has been executed • « NOK » if command has not been executed
Request	Str_Request	The executed command chain with all its parameters
Response	Str_Response	Response message following the command execution
Date	Dt_Date	Command execution date

Syntax XML

<Message Date="Dt_Date">
<Request>Str_Request</Request>
<Response ReturnCode="Str_ReturnCode">Str_Response</Response>
</Message>

Syntax Str

Str_ReturnCode : Str_Response: Dt_Date

10. DETAILED DESCRIPTION OF THE TAG VALUE

The tag value type is a variant as shown on the below table.

.NET Types and Their Marshaling Behavior Inside VARIANTs

Type of Instance	Variant Type
null (Nothing in VB .NET)	VT_EMPTY
System.DBNull	VT_NULL
System.Runtime.InteropServices.CurrencyWrapper	VT_CY
System.Runtime.InteropServices.UnknownWrapper	VT_UNKNOWN
System.Runtime.InteropServices.DispatchWrapper	VT_DISPATCH
System.Runtime.InteropServices.ErrorWrapper	VT_ERROR
System.Reflection.Missing	-VT_ERROR with value DISP_E_PARAMNOTFOUND
System.String	VT_BSTR
System.Decimal	VT_DECIMAL
System.Boolean	VT_BOOL
System.Char	VT_U2
System.Byte	VT_U1
System.SByte	VT_I1
System.Int16	VT_I2
System.Int32	VT_I4
System.Int64	VT_I8
System.IntPtr	VT_INT
System.UInt16	VT_U2
System.UInt32	VT_U4
System.UInt64	VT_U8
System.UIntPtr	VT_UINT
System.Single	VT_R4
System.Double	VT_R8
System.DateTime	VT_DATE
Any Array	VT_... | VT_ARRAY
System.Object or other .NET classes	VT_DISPATCH

The tag Value is to and initialized but empty object whenever the value type is unknown "**System.Object**". Because null (Nothing) is mapped to an "empty object" (a VARIANT with type VT_EMPTY) when passed to COM via a **System.Object** parameter, the new **DispatchWrapper(**null) or **new UnknownWrapper**(null)is passed on to represent a null object. This maps to a VARIANT with type **VT_DISPATCH** or **VT_UNKNOWN**, respectively, whose pointer value is null. Every tag will be cast to its definite value before being passed on to the OPC server.

11. DETAILED DESCRIPTION OF STANDARD TAG ATTRIBUTES “DATE” AND “QUALITY”

11.1 DATE ATTRIBUTE

The date attribute on each tag refers to the exact time when the observed value was recorded on a remote device (Beandevice®) and not to the date/time when the data was recorded on the OPC server.

11.2 QUALITY ATTRIBUTE

The “quality” attribute is used to gives an indication regarding the quality/reliability of the value. If one device is turned off or stops emitting, or if the connection is interrupted, then the item/ attribute “quality” and all its sub items will be set to “BAD” (except the “type” attribute/item). Indeed once the “type” attribute is set, its quality turns to good and will not change throughout time. The reason being that a sensor type will never change and the type value will not be submitted to any doubt whether the network is working or not.

Quality enum table:

Quality	*Quality Code*	*Description*
Bad	0	The value is bad but no specific reason is known.
badConfigurationError	4	There is some server specific problem with the configuration. For example the item in question has been deleted from the configuration.
badNotConnected	8	The input is required to be logically connected to something but is not. This quality may reflect that no value is available at this time, for reasons like the value may have not been provided by the data source.
badDeviceFailure	12	A device failure has been detected.
badSensorFailure	16	A sensor failure had been detected (the ’Limits’ field can provide additional diagnostic information in some situations).
badLastKnownValue	20	Communications have failed. However, the last known value is available.
badCommFailure	24	Communications have failed. There is no last known value is available.
badOutOfService	28	The block is off scan or otherwise locked. This quality is also used when the active state of the item or the group containing the item is InActive.
badWaitingForInitialData	32	After Items are added to a group, it may take some time for the server to actually obtain values for these items. In such

		cases the client might perform a read (from cache), or establish a ConnectionPoint based subscription and/or execute a Refresh on such a subscription before the values are available.OPC DA 3.0 or newer servers.
uncertain	64	The quality of the value is uncertain. There is no specific reason why the value is uncertain.
uncertainLastUsableValue	68	Whatever was writing this value has stopped doing so. The returned value should be regarded as 'stale'.
uncertainSensorNotAccurate	80	Either the value has 'pegged' at one of the sensor limits (in which case the limit field should be set to 1 or 2) or the sensor is otherwise known to be out of calibration via some form of internal diagnostics (in which case the limit field should be 0).
uncertainEUExceeded	84	The returned value is outside the limits defined for this parameter. Note that in this case (per the Fieldbus Specification) the 'Limits' field indicates which limit has been exceeded but does NOT necessarily imply that the value cannot move farther out of range.
uncertainSubNormal	88	The value is derived from multiple sources and has less than the required number of Good sources.
Good	192	The value is good. There are no special conditions.
goodLocalOverride	216	The value has been Overridden. Typically this is means the input has been disconnected and a manually entered value has been 'forced'.

Algorithm variable table:

Variable	Variable Description
no_transmit_alert	Boolean: True if the no transmit alert has been issued, else value set to False: The alert is issued whenever a no transmission cycle superior to 2 times the measurement cycle has been observed.
gateway_stopped	Boolean: True is gateway stopped, else value set to False
sensor_quality	Enum: (see Quality enum table: section 5.2)
device_quality	Enum: (see Quality enum table: section 5.2)
gateway_quality	Enum: (see Quality enum table: section 5.2)
beanscape_quality	Enum: (see Quality enum table: section 5.2)
device_sleepmode	SLEEP_MODE_DISABLED SLEEP_MODE_ENABLED SLEEP_MODE_LISTENING_ENABLED SLEEP_MODE_POWER_OFF SLEEP_MODE_STANDBY
power_Off	Boolean: True if device turned off, False if else

sensor_switch_On	Boolean: True if switched on, False if else
beanscape_server_stopped	Boolean: True if the server is switched Off, False if else

11.2.1 Sensor Quality Determination

The sensor quality algorithm:

```
IF ( no_transmit_alert == true OR gateway_stopped==true)
   THEN sensor_quality= badCommFailure
   EXIT
ENDIF


IF (device_sleepmode == power_Off)
  THEN sensor_quality= badNotConnected
ELSE
  THEN
     IF sensor_switch_On=true
        then then sensor_quality=good
     ELSE
        then sensor_quality= badNotConnected
     ENDIF
ENDIF
```

The same rule applies to all sub attribute TAG quality. The below tag quality attributes quality automatically inherit from the sensor signal quality attributes (in case of the OPC_XTEND version)

Sub tag list (OPC_XTEND case):

VT_BEAN_SENSOR_TYPE

11.2.2 BeanDevice® Quality Determination

The device quality algorithm:

```
IF ( no_transmit_alert == true OR gateway_stopped==true)
   THEN device_quality= badCommFailure
   EXIT
ENDIF


IF (device_sleepmode == power_Off)
  THEN device_quality= badNotConnected
ELSE
  THEN device_quality= good
ENDIF
```

The same rule applies to all sub attribute TAG quality. The below tag quality attributes quality automatically inherit from the sensor signal quality attributes (in case of the OPC_XTEND version).

Sub tag list (OPC_XTEND case):

VT_BEAN_BAT_CHARG_LVL

VT_BEAN_BAT_DIAG_BITMAP

VT_BEAN_BAT_LEVEL_VOLTAGE

VT_BEAN_INTERN_TEMP_LVL

T_BEAN_NETWK_QUAL

VT_BEAN_PER_GLOB

VT_BEAN_PER_LOC

VT_BEAN_SLEEP_MODE

11.2.3 BeanGateway® Quality Determination

The device quality algorithm:

```
IF (  gateway_stopped==true)
   THEN gateway_quality=bad_comfailure
 ELSE
    THEN gateway_quality=good
 ENDIF
```

The same rule applies to all sub attribute TAG quality. The below tag quality attributes quality automatically inherit from the sensor signal quality attributes (in case of the OPC_XTEND version)

Sub tag list (OPC_XTEND case):

VT_BEAN_BAT_CHARG_LVL

VT_BEAN_BAT_DIAG_BITMAP

VT_BEAN_BAT_LEVEL_VOLTAGE

VT_BEAN_INTERN_TEMP_LVL

VT_BEAN_NETWK_QUAL

VT_BEAN_PER_GLOB

VT_BEAN_PER_LOC

VT_BEAN_SLEEP_MODE

11.2.4 BeanScape® Quality Determination

The Beandevice® quality algorithm:

```
IF (  beanscape_Server_stopped==true)
   THEN beanscape_quality=bad_comfailure
  ELSE
    THEN gateway_quality=good
 ENDIF
```

11.2.5 Command tag quality determination

The command tag quality attribute will be set to “good” as long as the OPC server’s switched “ON”

12. APPENDICES

12.1 APPENDICE1: FIRST STEPS TO DEVELOP YOUR OPC CLIENT WITH C#

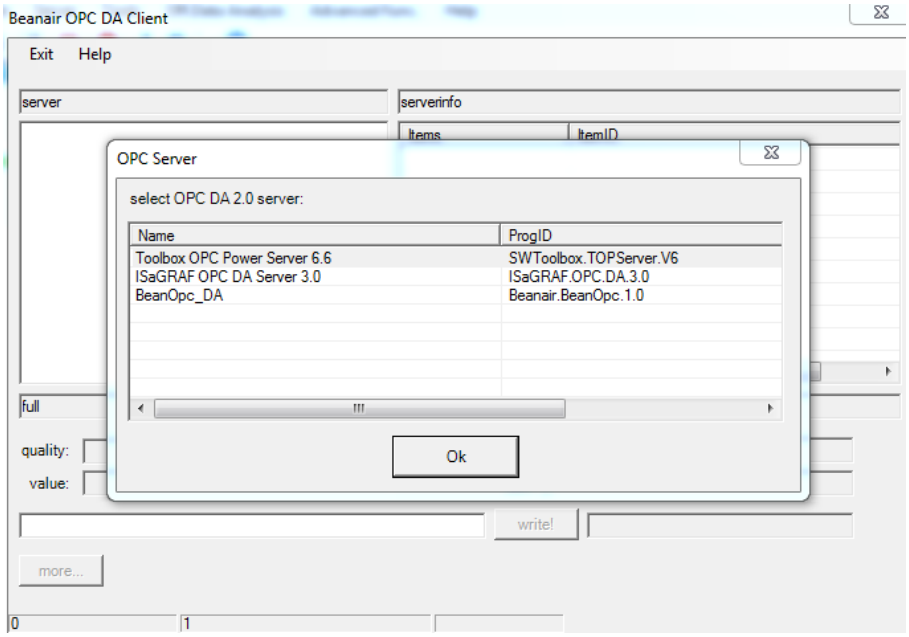
Download the whole code source of OPC DA project optimized by BeanAir® from http://www.beanair.com/opc-toolkit-wireless-iot-sensors.html

The source code was deployed using "OPCdotNETLib" library

OPC Core Components Redistributable is mandatory to work with OPC.

OPC servers listing

```
public void ListAllServers()
                {
                OpcDaSrvList.Items.Clear();

                OpcServerList    lst = new OpcServerList();
                OpcServers[]     svs = null;
                try
                        {
                        lst.ListAllData20( out svs );
                        }
                catch( COMException )
                        {
                        MessageBox.Show( this, "Enum OPC servers failed!", "Select Server",
MessageBoxButtons.OK, MessageBoxIcon.Warning );
                        return;
                        }

                if( svs == null )
                        return;

                string[]                itemstrings = new string[ 3 ];
                foreach( OpcServers l in svs )
                        {
                        itemstrings[0] = l.ServerName;
                        itemstrings[1] = l.ProgID;
                        itemstrings[2] = l.ClsID.ToString();
                        OpcDaSrvList.Items.Add( new ListViewItem( itemstrings ) );
                        }

                // preselect top item in ListView
                OpcDaSrvList.Items[0].Selected = true;
                }
```



Connecting to a selected OPC server

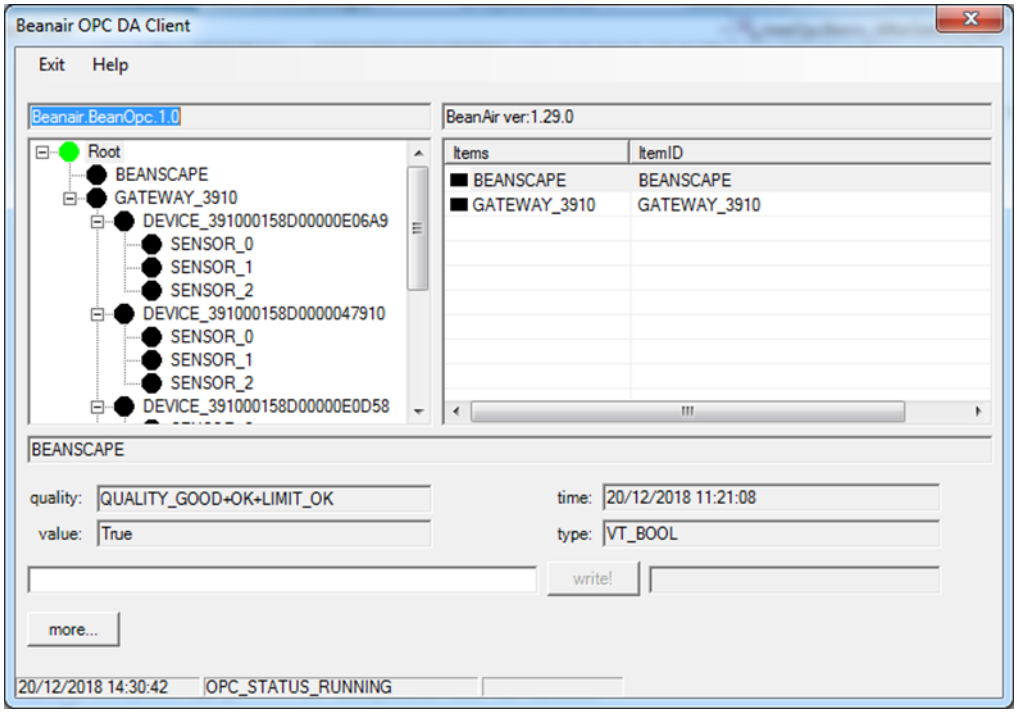
```
// connect to OPC server via ProgID
        public bool DoConnect( string progid )
                {
                try
                        {
                        theSrv.Connect( progid );
                        Thread.Sleep( 100 );
                        theSrv.SetClientName( "DirectOPC " + thisprocess.Id );   // set my
client name (exe+process no)

                        SERVERSTATUS sts;
                        theSrv.GetStatus( out sts );

                        // get infos about OPC server
                        StringBuilder sb = new StringBuilder( sts.szVendorInfo, 200 );
                        sb.AppendFormat(     "     ver:{0}.{1}.{2}",     sts.wMajorVersion,
sts.wMinorVersion, sts.wBuildNumber );
                        txtServerInfo.Text = sb.ToString();

                        // set status bar text to show server state
                        sbpTimeStart.Text    =    DateTime.FromFileTime(    sts.ftStartTime
).ToString();
                        sbpStatus.Text = sts.eServerState.ToString();
                        }
                catch( COMException e)
                        {
                        MessageBox.Show( this, "connect error!"+ e.Message, "Exception",
MessageBoxButtons.OK, MessageBoxIcon.Warning );
                        return false;
                        }
                return true;
                }
```

Group creation

```
public bool CreateGroup()
                {
                try
                        {
                        // add our only working group
                        theGrp = theSrv.AddGroup( "OPCdotNET-Group", true, 500 );

                        // add event handler for data changes
                        theGrp.DataChanged       +=       new       DataChangeEventHandler(
this.theGrp_DataChange );
                        theGrp.WriteCompleted     +=     new     WriteCompleteEventHandler(
this.theGrp_WriteComplete );
                        }
                catch( COMException )
                        {
                        MessageBox.Show(   this,   "create   group   error!",   "Exception",
MessageBoxButtons.OK, MessageBoxIcon.Warning );
                        return false;
                        }
                return true;
                }
```

Recursively call of OPC namespace Tree

```
// recursively call the OPC namespace tree
        public bool RecurBrowse( TreeNode tnParent, int depth )
                {
                try
                        {
                        ArrayList lst;
                        theSrv.Browse( OPCBROWSETYPE.OPC_BRANCH, out lst );
                        if( lst == null )
                                return true;
                        if( lst.Count < 1 )
                                return true;

                        foreach( string s in lst )
                                {
                                TreeNode tnNext = new TreeNode( s, 0, 1 );
                                theSrv.ChangeBrowsePosition(
OPCBROWSEDIRECTION.OPC_BROWSE_DOWN, s );
                                RecurBrowse( tnNext, depth + 1 );
                                theSrv.ChangeBrowsePosition(
OPCBROWSEDIRECTION.OPC_BROWSE_UP, "" );

                                tnParent.Nodes.Add( tnNext );
                                }
                        }
                catch( COMException /* eX */ )
                        {
                        MessageBox.Show(    this,    "browse    error!",    "RecurBrowse",
MessageBoxButtons.OK, MessageBoxIcon.Warning );
                        return false;
                        }
                return true;
                }
```


Beanair OPC DA Client
Exit
Help
Beanair.BeanOpc.1.0
BeanAir ver:1.29.0
Root
BEANSCAPE
GATEWAY_3910
DEVICE_391000158D00000E06A9
SENSOR_0
SENSOR_1
SENSOR_2
DEVICE_391000158D0000047910
SENSOR_0
SENSOR_1
SENSOR_2
DEVICE_391000158D00000E0D58
Items
ItemID
BEANSCAPE
BEANSCAPE
GATEWAY_3910
GATEWAY_3910
BEANSCAPE
quality:
QUALITY_GOOD+OK+LIMIT_OK
time:
20/12/2018 11:21:08
value:
True
type:
VT_BOOL
write!
more...
20/12/2018 14:30:42
OPC_STATUS_RUNNING