2.4GHz wireless sensors series



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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. Keep us informed of your comments and suggestions for improvements.

Beanair appreciates feedback from the users of our information.

2. VISUAL SYMBOLS DEFINITION

Symbols	Definition
	<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.

3. ACRONYMS AND ABBREVIATIONS

AES	Advanced Encryption Standard
ССА	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
МАС	Media Access Control
PAN	Personal Area Network
PER	Packet error rate
RF	Radio Frequency
SD	Secure Digital
WSN	Wireless sensor Network

4. DOCUMENT ORGANIZATION

BeanGateway [®] 4G product presentation	 Details the BeanGateway[®] 4G product presentation
BeanGateway [®] 4G installation guidelines	• Details the installation guidelines of the BeanGateway [®] 4G
Starting your application	 Details the BeanGateway[®] supervision from the BeanScape[®]
Maintaining and supervising your BeanGateway®	 Details the BeanGateway[®] maintenance (for experienced user)
Troubleshooting	• BeanGateway [®] FAQ
Environnemental Constraints	 Describes environnemental constraints (temperature, humidity, mechanical chocs, vibration)

5. BEANGATEWAY[®] 4G - PRODUCT PRESENTATION



- It is highly recommended to read all the user manual related to Beanair software & equipment (BeanScape[®] 2.4GHz, BeanGateway[®] 2.4GHz, BeanDevice[®] 2.4GHz) before getting start your BeanGateway[®].
- ✓ Use only accessories supplied by Beanair (power supply unit, and antenna). Use of other materials may damage the BeanGateway[®] 2.4GHz;
- ✓ Only Beanair is qualified to make changes on the BeanGateway[®] 4G;
- ✓ Don't try to remove the adhesive label on the product; it contains important information such as the MAC address

5.1 **PRODUCT OVERVIEW**

The **BeanGateway**[®] **4G** is used to build and manage Beanair wireless sensor networks. It can manage queues for every network element (BeanDevice[®]). As a gateway, it controls the external access to the network through a highly secured authenticated procedure. It supports the conversion of data exchanged, compression and IP connectivity with the network thereby reducing the intelligence required in these platforms, maintenance and therefore the associated cost.

It allows communication with the Wireless Sensors Network through IEEE 802.15.4 protocol.

It provides the following features:

- ✓ Design, configuration and supervision of the entire Wireless sensors network.
- ✓ Data Organization from the various sensors.
- ✓ Data Transmission to the BeanScape[®].
- ✓ Backing up wireless sensors network mapping.
- ✓ Information processing continuously even during a power outage.



Figure 1: BeanGateway[®] 4G - product overview



Figure 2: Inside the casing - description

5.2 OUTBOXING YOUR BEANGATEWAY® 4G

You should find the following accessories and options inside your box:

Specifications	Included accessories
4G Antenna	1 x 4G Antenna 12dBi - with pole mounting Ref: WL-4G-HG-ANT-12DBI
WIFI Antenna	1 x High Gain WiFi Antenna 9dBi - with pole mounting kit Ref: HG-OMNI-OUT-7DBI
External cable for WIFI Antenna	1 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
External cable for LTE Antenna	2 x N-Type cable, Cable Length: 1 meter Ref: CBL-ANT-1M
Waterproof Plug for AC Power Input (only for product Ref: BGTW-4G-MPWR- OUT)	1 x Circular Connector Hisrchmann CA 3LS, Waterproof IP67 R <mark>ef: WL-CA3LS-PLUG</mark>

5.3 TECHNICAL SPECIFICATIONS

Product reference		
BGTW-4G-PWR-OUT	BeanGateway Outoor with 3G/4G/LTE Connectivity	
PWR - External Power supply	SOLAR - Power Supplied from external solar panel MPWR - Mains power supply (Input: 90 to 264VAC)	
Examples	BGTW-4G-SOLAR-OUT, BeanGateway Outoor with 3G/4G/LTE connectivity, Power supplied from solar panel BGTW-4G-MPWR-OUT, BeanGateway Outoor with 3G/4G/LTE connectivity, Mains Power Supply	

5.3.1 2.4GHz wireless coordinator

	Wireless Sensor Network Coordinator
Wireless Technology	Ultra-Power and license-free 2.4Ghz radio technology (IEEE 802.15.4E)
WSN Topology	Peer-to-peer/ Star
Raw data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels
RF Transmit power	+18 dBm
Receiver sensitivity	-104 dBm
Maximum Radio Range	1 km (Line of Sight) , 70-150m (Non Line of Sight)
	· Energy Scan for choosing a suitable RF Channel
	· BeanDevice [®] PER (Packet Error Rate) calculation
WSN Diagnostic tool	\cdot LQI (Link Quality Indicator) between the BeanGateway® and the BeanDevice®
	· RF channels Blacklist

5.3.2 3G/4G/LTE Modem

	3G/4G Connectivity specifications
LTE	 LTE FDD: B1/B3/B5/B7/B8/B20 LTE TDD: B38/B40/B41 LTE CAT4 up to 70 Mbps DL LTE CAT4 up to 50 Mbps UL Class 3 (23dBm±2dB) for LTE FDD Class 3 (23dBm±2dB) for LTE TDD
UMTS/DC-HSPA+	 850/900/2100 MHz DC-HSPA+ mode: Max 42Mbps (DL) Max 5.76Mbps (UL) UMTS mode: 384 kbps DL, 384 kbps UL TD-SCDMA: Max 4.2Mbps (DL) Max 2.2Mbps (UL) Power Class 3 (24dBm +1/-3dB) for UMTS bands Class 3 (24dBm+1/-3dB) for TD-SCDMA
GSM/GPRS/EDGE	 900/1800 Mhz GPRS/EDGE Multi-slot Class 12 Power Class E2 (27dBm ±3dB) for GSM 900 Power Class E2 (26dBm +3/-4dB) for DCS 1800 Power Class 4 (33dBm ±2dB) for GSM 900 Power Class 1 (30dBm ±2dB) for DCS 1800

5.3.3 2.4GHz High Gain Antenna

9dBi 2.4GHz antenna specifications







VSWR and GAIN





Ref: HG-OMNI-OUT-9DBI



Antenna reference: HG-OMNI-OUT-9DBI

5.3.4 Dual LTE Antenna



Figure 3: Dual LTE Antenna with u-clamp mounting kit

The enclosure of this multiband 4G antenna is manufactured from robust, weather-resistant and UV-resistant plastic / PVC. This allows to use this 4G antenna for in- and outdoor appliances even under extreme weather conditions.

The antenna is designed for mast/pole or wall handle installation. A mounting kit (u-clamp for 30-50mm diameter handles) is included.

	Omnidirectional 4G Antenna (2x2 MIMO)
	Weather-resistant and UV-resistant plastic / PVC enclosure
	VSWR < 1.8
	Impendance: 50 Ohm
	Beamwidth: 360° Horizontal - 20° Vertical
	Gain :
	8dBi @ 800 MHz
Omnidirectionnal 4G Antenna	12dBi @ 1800MHz
	12dBi @ 2600MHz
	Frequency:
	791-862 MHz (2G, 4G)
	1700 - 2100 MHz (3G, 4G)
	2500 - 2700 (4G)
	Connectors: 2 x N female
	Mounting Kit: U-clamp for 30-50mm diameter handles

5.3.5 Solar Panel power supply with UPS Battery (Ref: BGTW-4G-SOLAR-OUT)



Figure 4: 50W solar panel

The 50W Solar panel is provided with 4 x brackets and 4 x M5 screws.

External mounting brackets enable the Solar Panel to be wall or panel mounted without opening the box.



Figure 5: Solar Panel Drawing

	Solar Panel power supply with UPS Battery (Ref: BGTW-4G-SOLAR-OUT)
Battery	Valve Regulated Lead-Acid (VRLA) Capacity 12Ah
Solar panel technology	Monocristalline 50W, anodized aluminum frame. Surface protection with ESG solarglass. Dimensions (LxWxH): 650mm x 505mm x 30mm
Solar charging controller	Maximum Input current: 6A Power consumption < 2.5mA , Led switch on Nominal voltage :12VDC Led displays: battery full and charging
Socket for Solar Panel Connection	Industrial and Waterproof Socket Circular Socket CA 3 GD - Hirschmann Rated Voltage: 400VA Rated Current: 16A

5.3.6 AC power supply with UPS battery (Ref: BGTW-4G-MPWR-OUT)

	AC power supply with UPS battery (Ref: BGTW-4G-MPWR-OUT only)
Battery	Valve Regulated Lead-Acid (VRLA) Capacity 12Ah
Battery protection	Overvoltage/Overload/Short circuit/Battery low/Battery reverse polarity
AC Voltage Range (Input)	90 to 264VAC
AC Range (Input)	0.75A/115VAC 0.5A/230VAC
Frequency Range	47 ~ 63Hz
Inrush current	Cold Start 20A/115VAC, 40A/230VAC
Safety and EMC	Safety standards: UL60950-1, TUV EN60950-1 approved Withstand Voltage: I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:0.5KVAC Isolation Resistance TANCE: I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25°C/ 70% RH EMC emission: Compliance to EN55032 (CISPR32) Class B, EN61000-3-2,-3 EMC immunity: Compliance to EN61000-4-2,3,4,5,6,8,11, EN55024, light industry level, criteria A
Socket for AC power supply	Industrial and Waterproof Socket Circular Socket CA 3 GD - Hirschmann Rated Voltage: 400VA Rated Current:16A

An integrated rechargeable Lead-Acid battery with a capacity of **12Ah** is used as an UPS battery (uninterruptible power supply). The internal battery provides instantaneous protection from external power supply interruptions, the wireless sensor network activity & Ethernet LAN activity are maintained during this time (*18h approximately*). The *BeanGateway® 4G* starts emitting a beep sound every 2 seconds. The beep sound will stop when the external power supply is restored.



Precautions:

- ✓ Do not try to change the internal battery. You will void the warranty of your BeanGateway[®] 4G.
- ✓ Use the power supply wall plug-in provided by Beanair[®].

6. BEANGATEWAY® INSTALLATION GUIDELINES

6.1 HOW TO MOUNT THE BEANGATEWAY® 4G

Your BeanGateway[®] 4G should be mounted on the vertical position with the antenna socket pointing to the ground. Use a padlock to protect your BeanGateway[®] 4G casing against vandalism.

6.2 HOW TO MOUNT THE SOLAR PANEL



2.4GHz wireless sensors series



Figure 6: Solar Panel Drawing

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2.4GHz wireless sensors series

6.3 POWER SUPPLY

Socket Ref: 932321100 , Provider: Hirschmann

6.3.1 Solar Power supply (Ref: BGTW-4G-SOLAR-OUT) Socket for solar power supply DEANGATEWAY-4G-SOLAR-OUT DIVIC - Solar Panel (Pin 2) Position Notch Position Notch Ref: 932321100, Provider: Hirschmann

Figure 7 : Solar Panel – wiring code

6.3.2 Mains power supply (Ref: BGTW-4G-MPWR-OUT)



7. HOW TO SETUP A REMOTE ACCESS?

7.1 REMOTE ACCESS OVERVIEW



Figure 10: Remote access to monitoring site

Alarms by email are not available on both BeanScape[®] 2.4GHz Manager and BeanScape[®] 2.4GHz Basic.

Make sure that your ADSL Box <u>is using a fixed public IP Address</u>, otherwise you can lose the connection between the BeanGateway[®] 4G and the monitoring PC.

If you are not sure to have a fixed public IP, we suggest you to use a 4G Router and a SIM Card <u>with a fixed</u> public IP.

7.2 BEFORE TO START YOUR SYSTEM CONFIGURATION

We suggest you using a laptop to configure both 3G/4G Router and your wireless coordinator (BeanGateway[®]). Make sure to uninstall or disable any firewall/antivirus which can block the communication between the PC and these two devices.

There is a flat ethernet cable which is connecting the 4G Router to the wireless coordinator, use this cable for your configuration.

"Rethinking sensing technology"

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Install your BeanScape[®] 2.4GHz software on both Monitoring PC and your configuration Laptop. It's highly recommended to configure and test all your equipment before to bring it on your monitoring site.



Figure 11: 4G Router and Wireless coordinators configuration

7.3 3G/4G ROUTER CONFIGURATION

7.3.1 Front and Back sides description



Location	Description
1	LAN Ethernet Port
2	WAN/LAN Ethernet Port (Covered, do not use)
3	LAN LED
4	WAN LED
5	Power connector
6	Power LED
7	Signal strength indication LEDS
8	SIM card holder



Location	Description
1	WIFI Antenna connector (do not use)
2	LTE Antenna connector
3	Reset Button

Figure 12: Front and Back panel description



- WAN/LAN Ethernet Port should not be used. Don't try to connect your RJ45 Cable to this port
- WIFI Antenna connector should not be used, by default WIFI function is disabled on your 4G Router

7.3.2 Connection status LED

LEDS Display	Description
Signal strength status LEDS Turned on	Router is turning on
2G and 3G LED's constant blinking every 1sec	No SIM card or wrong SIM card
2G/3G LED's blinking every 1 sec	2G/3G connected but no data session established
Blinking from 2G LED to 3G LED repeatedly	SIM holder not inserted
2G/3G LED turned on	Connected 2G/3G with data session
2G/3G LED blinking rapidly	Connected 2G/3G with data session and data is being transferred

Figure 13 : 4G Router LEDS Status

7.3.3 SIM card Insertion

Insert SIM card provided by your ISP (Internet Service provider). Correct SIM card orientation is shown on the following picture:

Sim Card insertion



7.3.4 Logging to your 4G Router



6. By default DHCP is enabled on your PC, i.e. IP

address can be automatically allocated

2. Select Ethernet Settings



4. right click on your Ethernet device which is connected to your 4G Router

Setwork Connections Internet Protocol Version 4 (TCP/IPv4) Properties Organize • Disable this network device Diagnose this connection General Alternate Configuration You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. Bluetooth Network Connection 2 ExpressVPN Status Diagnose Bridge Connections Obtain an IP address automatically O Use the following IP address: Create Shortcut Delete IP address: 👎 Rename Subnet mask: Properties Default gateway: Ethernet Properties Networking Sharing Obtain DNS server address automatically 5. Click on Properties, then select Connect using O Use the following DNS server addresses: 🛃 Intel(R) met Connection I219-LM Internet Protocol Version 4 Preferred DNS server: Configure... (TCP/IPv4) then click on Properties ses the following items: Alternate DNS server: Clert for Microsoft Networks Gert for Microsoft Networks GoS Packet Scheduler Internet Protocol Vension 4 (TCP/IPv4) Validate settings upon exit Advanced... Protocol Anapter Muss R Network Adapter Muss H LLDP Protocol Driver Version 6 (TCP/IPv6) OK Cancel Instal... Uninstal Properties I/Internet Protocol. The default hat provides communication

OK Cancel

ternet Protocol Version 4 (TCP/IP	v4) Properties $ imes$	7. Choose Manual IP configuration
eneral You can get IP settings assigned au this capability. Otherwise, you need for the appropriate IP settings. Obtain an IP address automati O Use the following IP address: IP address:	tomatically if your network supports d to ask your network administrator ically	 First configure your PC IP address. The 4G router is configured with the default IP Address 192.168.1.1 . You center an IP in the form of 192.168.1.XXX, where XXX is a number in the range of 2-254. Avoid to use the same IP address than your 4G Router wh is 192.168.1.1 Enter 255.255.255.0 for your subnet mask The default gateway must come with the same IP address
Subnet mask: Default gateway: Obtain DNS server address au Obtain DNS server address au Obtain DNS server a Preferred DNS server:	255 . 255 . 255 . 0 192 . 168 . 1 . 1 tomatically addresses: 192 . 168 . 1 . 1	 that your 4G Router 192.168.1.1 Finally enter primary DNS server IP , the same than your 4 Router IP 192.168.1.1 Click on OK validate your configuration
Alternate DNS server:		Your Ethernet Icon is displayed connected
Ualidate settings upon exit	Advanced	Network and Internet > Network Connections
	OK Cancel	vice Diagnose this connection Rename this connection View status of this connectio
n this example we confi Vith 192.168.1.20.	gured the PC IP address	Sthernet Sthernet 2

- 9. Enter username and password, by default these settings are:
 - Username: admin Password: admin01

then click on login, you will get logged into your 4G Router

	ΤΟΝΙΚΑ
Autho	rization Required
Please enter	ryour username and password.
Username	admin
Password	•••••
	Login

7.3.5 SIM Card configuration

	General Mobile Data Limit		The connection type used when connecting to a network. It can either be PPP or QMI. PPP is considerably slower than QMI. QMI is highly recommended
	Mobile Configuration		
	Mobile Configuration		Access Point Name (APN) is a configurable network identifier used by
	Connection type	QMI V	a mobile device when connecting to a GSM carrier.
	Mode	NAT	Fill out this field only if your SIM card has PIN enabled
	APN	internet	Fill out this field only if your SIM card has PIN enabled
	PIN number	0901	
	Dialing number	*99#	Leave this held empty
	МТО	1500	No need to fill out this field
	Authentication method	None V	Leave this field empty
	Service mode	Automatic •	If enabled this function prevents the device from establishing mobile
	Deny data roaming		data connection while not in home network.
	Use IPv4 only		This box is checked by default
	Mobile Data On Demand		
	Mobile Data On Demand		
	Er	able 🕑	
	No data timeout	(sec) 10	
	Force I TE network		
		abla 🕫	
	Er		
	Rereg	jister	
	Interval	(sec) 300	
			Save
9			
Y	ou can get the APN ID fro	m your telecom opera	itor provider
	f an invalid PIN number wa	s entered (i.e. the ent	ered PIN does not match the one that was used to
protect t	the SIM card), your SIM ca	rd will get blocked. To	avoid such mishaps, it is highly advised to use an
unprote	cted SIM. If you happen to	insert a protected SIN	A and the PIN number is incorrect, your card won't ge
blocked	immediately, although after	er a couple of reboots	OR configuration saves it will.

For configuring your 4G/LTE Router go on Network then Click on Mobile



7.4 2.4GHZ WIRELESS COORDINATOR CONFIGURATION

7.4.1 Getting the public IP for your monitoring PC



Make sure that your ADSL Box <u>is using a fixed public IP Address</u>, otherwise you can lose the connection between the BeanGateway[®] 4G and the monitoring PC.

If you are not sure to have a fixed public IP, we suggest a 4G Router and a SIM Card with a fixed public IP.

1. First step: Get your Public IP of your PC used at the Office, use a web browser and search for My IP Address



Make sure that no antivirus/firewall is blocking the Network activity between the BeanGateway[®] 2.4GHz and the BeanScape[®] 2.4GHz

7.4.2 Wireless Coordinator IP Configuration

Use the flat Ethernet cable to connect the wireless coordinator to your configuration PC.



5. Select your LAN Card IP address (Default IP: 192.168.1.20), then click on Localize

Configuration port selection					
Serial port		Ethernet			
Select serial port		Ethernet config			
Serial port : < En	npty >	192.168.1.20 LAN Card		Localize	
		< Empty >			
onfigurations					
Tcp/IP configuration		KeepAlive App Config			
DHCP Enabled		Enabled			
BeanGateway Tcp/IP		Timeout (ms) :	15000		
IP address :	192.168.1	Interval (ms) :	4000		
Sub network mask :	255.255.255.0	Max. retry nbr. :	7		
Default gateway IP :	192.168.11			Validate	
DNS Enabled DNS IP Auto, DNS		Configuration via Ethernet (UDP)		
		Enabled			
IP address :		UDP port :	53130		
BeanScape			- 1	Validate	
Port :	5313				
IP address :	192.168.120_				
Domain name :					

leanGateway Ethernet/LA	N computation			×	1
Configuration port selection					
Serial port		Ethernet			
Select serial port		Ethernet config			
Serial port : < E	mpty > 🗸	192.168.1.20 LAN Card	v	Localize	
		Control Made - 00159	00000505	×	
Configurations		. ene . 0000, media . 001000		~	
Tcp/IP configuration		KeepAlive App Config			
DHCP Enabled		Enabled			
BeanGateway Tcp/IP		Timeout (ms) :	15000		
IP address :	192.168.1	Interval (ms) :	4000		
Sub network mask :	255.255.255.0	Max. retry nbr. :	7		
Default gateway IP :	192.168.11_			Maždata	
				valuate	
DNS Enabled	IS IP Auto.	Configuration via Ethernet			
DNS		Enabled	53130		
IP address :					
BeanScape					
Port :	5313				
IP address :	192.168.120_				
Domain name :					

7. Configure LAN settings on your BeanGateway®



If the public IP Address of your ADSL Box is not fixed, you will lose the connection between the BeanGateway[®] and your Monitoring PC. If you are not sure to have a fixed public IP, we suggest you use a 4G Router and a SIM Card with a fixed public IP. Appendices 1 is describing how to select a SIM card for a 4G router.



8. On your Monitoring PC, configure the TCP port to listen on your Monitoring PC



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7.5 PORT FORWARDING CONFIGURATION

To not lose the remote access it's highly recommended to use a static IP on your Monitoring PC

• Changing your PORT forwarding on your LAN/WIFI Router located at your office will not enable PORT forwarding between PUBLIC/PRIVATE IP.

You can find port forwarding settings on your ADSL/4G Router used at your office. If your ADSL Box comes with restricted PORT allocation and if the public IP is updated very often, we will suggest using a 4G Router.

7.5.1 Example of PORT Forwarding configured from an ADSL BOX - FritzBox (Germany)



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8. BEANGATEWAY®- WIRELESS COORDINATOR PROFILE DESCRIPTION

Click on a *BeanGateway®* 4G network coordinator located on the lower left window. The *BeanGateway®* 4G is identified by its PAN ID.



✓ You will see the following window:

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BeanScape					- 8 ×
BeanScape File Server Tools Data Analysis BeanGateway Help Image: Server Tools Data Analysis BeanGateway Help Image: Server Tools Data Analysis BeanGateway Help	BeanGateway profile Identity Mac Id: 2015820000655645 Pan Id: 2000 Net Id: 2000 Label: 2A14.10:0.0.x3900 Version 4.vers.: rd.vers.: 2455 rd.vers.: VERB Additional Module 2000	Radio Configuration Radio channel: 25 Used RF channels 11:25 Power Supply Diagnostic uperature: 20:375 ar supply: Marks ar supply: Marks	System Diagnostic cycle : 20100 add/01.00	55	Status Area
AN LID : 0 x 3900	Custom display Notes Radio Config. System Type: SITE_TYPE Reference: SITE_REF Label: PAN_D: 0 x 3900	vottage : 4-197 v ry level : Coost (IIII) DiagDate : 0110/2018 844-35 PM Config. Module logger Modbus Multicasting Upload Br	Beep sound funct : Presided Network Status : Prabled aanDevice profile		
	Validate			-	Settings Area
rver status : Started		o 💷 🕢 🖩 🙉		1	R ^R ^ 🚳 8:44 PM 18-Mar-18 🕏

The BeanGateway[®] 4G profile is divided into two frames:

- ✓ Profile Area
- ✓ Settings area

8.1 STATUS DESCRIPTION

	This frame displays all the ID allocated to the BeanGateway [®] :
	MAC Address (encoded on 64-bits): MAC Address (encoded on 64-bits): The Media Access
	Control address is a unique identifier assigned to the BeanDevice® by the manufacturer for
	identification.
	 PAN Address (encoded on 16-bits): Personal Area Network address.
	 Network Address on 16-bits: This address is allocated by the BeanGateway[®] when you start the network.
	• Label: By default the MAC address is registered as a Label. This label can be changed by the
	user.
	Radio configuration:
	• TX power: Displays Radio TX Power in dBm (antenna power is not included)
	Radio channel: used (Radio Channel between 11 and 26)
	Used Radio Channels: Authorized RF Channels are displayed here;
	This frame displays the BeanGateway [®] version:
3	Hardware version: BeanGateway [®] hardware version
	Software version: BeanGateway [®] software version
	Module: Additional module
	Soft. version: Software version of the additional module
	Battery status frame. See next section.
4	
	Diagnostic Cycle: Displays diagnostic cycle in seconds (battery charge status, internal
5	temperature, LQI, PER).
	Beep sound funct.: Displays buzzer status
	Network Status.: Displays network status
	 Temperature: Internal temperature of the BeanDevice[®] with a resolution of 0,125°C
6	Power supply Status: Main or Battery
	 Power mode: active / sleep with network listening / down
	Battery voltage: Battery voltage in Volts
	• <i>Battery level</i> : Battery charge level, 0 to 100% with a resolution of 0, 01%
	Diag Date: Displays the last diagnostic date

Figure 14: Status Description

8.2 USER-CONFIGURABLE PARAMETERS

MAC_ID : 0	× 00158D 000004C79F × 00158D 000000CE 564	Dat	ta				
in mac_lo:(x 001580.0000378806 x FFFFFFFFFFFFFFFFF		BanG atteway profile Macid: Extract conservation Macid: Extract conservation Network Globa Label: Extract conservation Version Ferrers	Negrostic paskly:	ter Cruster de la construction d	eway®	configuration
			Lado model : Carlo Color and A Hard vers : Hill Battery v Soft vers : Hill Battery v Prot model : State Softward (System Coring, 1 Type Sint_Profile Reference: Softward (System Coring, 1 Type Sint_Profile Reference: Softward (System Coring, 1 Validate	Alfoni System System System System System System Alton: <u>Verse</u> V Tar larket: <u>Nature</u> <u>v</u> Tar larket: <u>Nature</u> <u>v</u> Tar eterrety mode! <u>Gpr model</u> <u>Model</u>	rgde: Loge		
Endower List Set	*=	incer Top					
Server status : Star	ed						

Frame	Description
Custom Display	Customize the BeanGateway [®] label
Notes	This area contains the notes related to the BeanGateway [®] .
Configuration	Radio parameters configuration (RF channels, Energy Scan, PAN ID)
System configuration	System configuration (Diagnostic cycle, Nwk deletion, Post system clock)
Module Status	Module status (Logger)

Figure 15: User-configurable parameters

8.2.1 Custom Display



Parameter	Description
Туре	You can enter here the type of BeanGateway [®] you want to use.
Reference	You can assign an internal reference to the BeanDevice [®] you have purchased.
Label	You can assign any sort of Label to your BeanGateway [®] . Therefore, the user can easily associate the BeanGateway [®] with its equipment or environment (example: Nwk_Room_1, Nwk_Room_2).

8.2.2 Notes

This area contains the notes related to the BeanGateway[®]. To edit this field, enter data to save and click on "Validate".



8.2.3	Radio	Configuration	Ì
-------	-------	---------------	---

Custom disp	lay Notes Radio Config. System Config. Module status Gsm	module Gps module
PanId Co	nfiguration	
	New Pan Id (Hex.) : 0x38FE 🔷 Validate	
Radio Ch	annel Configuration	
	Channel list : Ch_Auto ~	
	Scan duration : <selection> < Validate</selection>	
RF Powe	r	
	Tx Power : +5 dBm ∨ Validate	
Wireless	Sensor Network diagnostic tool	
11101000	Former Come a Contraction by the Request	
	Energy Scan : < selection > ~ Request	
Authorize	d RF Channels configuration	
11 12	13 14 15 16 17 18 19 20 21 22 23 24	25 26
	Validate	
Setting	Description	Watch the short
		technical Video (Click on the Icon)
PAN ID	Select a PAN ID value between 0 to 3FFF. If you	
Configuration	select a value > 3FFF, the value will not be assigned.	
	Enter a value without "0x". Example: 03AB , 3DC2.	
	Custom display Notes Radio Config. System Config. Module status Gsm module Gps n	
	PanId Configuration New Pan Id (Hex.): 0x38FE	
	In the case if you have several networks	
	In the case if you have several WSN	
	connected to your BeanScape"	

Radio Channel configuration	List of channels on which the component can be set. The maximum number of RF channels is 16. The user can select a RF channel manually or automatically. Blacklisted RF channels will not appear in this list. « <i>Ch_Auto</i> » is an automatic detection of the most effective channel between channel 11 and channel 26. To change this area, select a value from the list and click the "Validate" button to save the base area.	Automatic RF channel selection
	If an automatic detection is selected, the user can select the scanning duration on each channel. It is strongly recommended to select Automatic channel selection if you have few information about radio activities on your site.	Manual RF Channel selection
Energy Scan (Diagnostic)	The Energy Scan allows the user to know the network quality on each Radio channel. This operation allows the user to choose the appropriate RF channel on a site where the WSN is deployed. This value can vary between 0 (excellent) and 255 (poor). You can configure the scanning time means of each radio channel, by selecting the tab the scan time in ms and confirm it by pressing the "validate" button. A new energy scan is performed by clicking on the "Validate" button. A new to the scan is performed by clicking on the "Validate" button.	
Authorized channel selection	Select the RF channels which must be used. The RF channels which are not selected are blacklisted from the energy scan process & automatic RF channel selection.	

Select RF channels with the least detected activity.



Figure 16 : Conversion table - Energy Scan power in dBm

8.2.4 System Configuration

BeanGatewav profile			
Identity	Radio Configuration	Dattage Cast	
Mac Id : 00158D00000E	D424 Tx power : +5 dBm	dB	s Disable discharge
Pan Id : 3200	Radio channel : 26		Disable charge
Net. Id : 0000	Lised RE channels 11.26	Disch	narge over current
Label : PAN ID : 0 x 2		a	narge over current
			Undervoltage 🔵
Version	Power Supply Diagnostic		Overvoltage 🔵
Hard. vers. : V3R5	Temperature : 36,625	°c System	
Soft. vers. : V5R8	Power supply : Bat	Diagnostic	cycle : 00:01:00 ddd bhimmiss
Additional Module	Power mode : active	Beep sound f	unct. : Disabled
Module : Ethernet Modb	Battery voltage : 3,747	V Network 9	
Soft. vers. : V5R1	Battery level : 0,00	% Network 3	
	DiagDate : 222050	2016 13:35:29	
Diagnostic cycle configuration Diagnostic cycle configuration Diagnostic cycle : Profile Erasement / Back to defa Network profile deletion : Beep sound configuration Beep sound : Delete Device Device List:	Ing. System coning. Module logger Mc s Validate ult config. Beandevices ▼ Delete Disabled ▼ Validate <select> Validate</select>	wk disable	apiiy
Figure 17: System configur	ation Tab		

Setting	Description	Watch the short technical Video (Click on the Icon)
Diagnostic cycle	You can set the BeanGateway® diagnostic cycle (Battery status).	
Profile erasing/ Back to default/ Network button	 This field is used for BeanDevice® profile erasing or factor settings restoration. <u>Network profile deletion</u>: BeanDevice® profiles are deleted from the BeanGateway® Database <u>&</u> RF parameters are restored to the factory settings (TX power, Authorized RF channels, RF Channel). <u>Full:</u> BeanDevice® profiles are deleted <u>&</u> RF parameters are restored to the factory settings (TX power, Authorized RF channels, RF Channel). <u>Full:</u> BeanDevice® profiles are deleted <u>&</u> RF parameters are restored to the factory settings (TX power, Authorized RF channels, RF Channel) <u>&</u> LAN/Ethernet parameters are restored to the factory settings (Dick on Delete <u>Network enable/disable</u>: You can enable and disable the "Network" button on your BeanGateway from BeanScape with "Nwk disable/enable". This function is useful when you want to eliminate the risk of losing your BeanDevices profiles by accidentally pushing the Network button on the BeanGateway. 	
Beep sound configuration	Only available on the BeanGateway Indoor Configure the Buzzer alarm: Disabled: Buzzer is disabled Battery alarm event: The BeanGateway [®] emits a beep sound every 2 seconds if the external power supply is disconnected Localize: A beep sound allows to localize your BeanGateway [®]	
Delete Device	Remove a BeanDevice® from your network You can use "Delete Device" function in order to remove a BeanDevice from the list.	

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8.2.5 Upload Cartography

Custom display	Notes	Radio Config.	System Config.	Module logger	Modbus	Multicasting	Upload Cartography
BeanDevice				-19-			
Netwo	rk Id						
MAC I	d	1					
			Valid	late			

The module above is used for connecting another BeanDevice operating on a different BeanGateway to this BeanGateway.

This function is useful if you've lost connection with a BeanGateway and need to connect the BeanDevices to a different one without performing a Network operation on the BeanDevices (let's suppose that access to BeanDevices is not easy).

To upload the cartography of the BeanDevice on a different BeanGateway, please follow the instructions below:

- Put the PAN ID of your previous BeanGateway
- Select the Radio Channel of your previous BeanGateway
- Write down the Network ID and MAC ID of your BeanDevice
- If your BeanDevice requires restart, you can use the restart button from BeanScape in System Config.



This function is assimilated to a BeanGateway cloning operation in order to make the BeanDevice believe that the second BeanGateway is the first one.



See "Export & Import BeanDevice Profile" YouTube video

8.3 LOG FILE ORGANIZATION

8.3.1 Log file system overview



8.3.2 Log file directory

By default the Log file directory is: C:\log_beanscape

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

💔 BeanScape						
File	Тос	ols	Help			
		Options				
		А	larm Alert			
		В	eanGateway Telemetry Mode			
		В	eanGateway Serial Port Config			
	_					

This window lets you configure the logs, and the data cache.

✓ You will see the following window :

LOG Configuration		
Log directory :	C:Vog_beanscape	
Main Log filename :	LOG	
Main log max. size :	200	
Log level :	0 0 1 0 2 0 3	
Sensor Log enabled :		
Sensor log max. size (KB) :	1024	
Network log info. enabled :		
Network info log max. size (KB) :	1024	
Streaming log max, size (KB) :	2048	
BGw Module Log enabled :		
BGw Module log max. size (KB) :	1024	
Syst. Maint. Status Log enabled :		
Syst. Maint. Status log max size	1024	
Tcp/lp Configuration		
Tcp port to listen :	5313	
Keen Alive Ann		
KeepAliveApp enabled :		
KAA timeout :	10000	
KAA interval	2000	
Max retry :	5	
PopeGatoway configuration via 11	to.	
Udp.pot :	53130	
Language Configuration	Auto	
	English	
	French	
System Configuration		
System clock transmission		
LIOCK transmission interval (sec) :	3600	
Alarm => sound affect :		
Data Cache Configuration	<u> </u>	
Max. points	40000	
May nackate ·	6	
Max diagnostice :	1000	
max. diagnostics :	1000	
Max. alarms :	20	
Gps coord. max. number :	100	
Max. streaming points :	10000	
Max. BGw Module status nbr. :	100	
Svst. Maint. Status max nbr :	500	

PFor further information about the BeanScape[®] configuration, please read the BeanScape[®] User Manual.

9. MULTI-WSN CONFIGURATION



Figure 19 : A multi-WSN architecture

These settings are mandatory:

- PAN ID should be different between each BeanGateway[®]
- If your PAN is not different you will have a network conflict between the different WSN

These settings are highly recommended:

- The distance between each BeanGateway® should be at least 2 meters
- Different Radio channel should be used

10. MAINTAINING AND SUPERVISING BEANGATEWAY®

10.1 DIAGNOSIS USING BEANSCAPE®

Using the BeanScape[®] software, BeanScape[®] diagnostic information and self-monitoring can be visualized.

10.1.1 Knowing the PAN ID and IP address of your BeanGateway®

To find the IP address and ID PAN BeanGateway[®] network click "hide" in the window at the bottom left of BeanScape [®].

You see the following window:

ID PAN_ID IP 1 2012 192.158.0.250 BeanGateway® IP / PAN ID INFD: 17/03/2010 11:22:59: Server starting INFD: 17/03/2010 11:22:59: Server started INFD: 17/03/2010 11:22:59: Server started PAN ID INFD: 17/03/2010 11:22:59: SocketListener pending INFD: 17/03/2010 11:22:59: SocketListener pending INFD: 17/03/2010 11:22:59: SocketListener pending INFD: 17/03/2010 11:22:59: SocketListener pending INFD: 17/03/2010 11:22:59: SocketListener pendetor INFD: 17/03/2010 11:22:59: SocketListener pendetor INFD: 17/03/2010 11:22:59: Sory, no connection requests have arrived INFD: 17/03/2010 11:22:59: Nor, no connection requests have arrived INFD: 17/03/2010 11:23:00: Sory, no connection requests have arrived INFD: 17/03/2010 11:23:00: Sory, no connection requests have arrived INFD: 17/03/2010 11:23:00: Sory, no connection requests have arrived INFD: 17/03/2010 11:23:00: Success BeanGateway.The site record found succesfully in the UserCustomDB PAN_ID= 2012 MAC_ID= 00158D0000048405 INFD: 17/03/2010 11:23:01: Success BeanSensor.The site record found succesfully in the UserCustomDB PAN_ID= 2012 MAC_ID= 00158D00000048405 INFD: 17/03/2010 11:23:01: Success BeanSensor.The site record found succesfully in the UserCustomDB PAN_ID= 2012 MAC_ID= 00158D00000048405 INFD: 17/03/2010 11:23:01: Success BeanSensor.The site record found succesfully in the UserCustomDB PAN_ID= 2012 M	💞 BeanScape Server	
1 2012 192.168.0.250 BeanGateway® IP Action Provided Formation Provided Formation Provided Formatting Provided Formatti	ID PAN_ID IP	
INFD : 17/03/2010 11:22:59: Server starting INFD : 17/03/2010 11:22:59: Server started INFD : 17/03/2010 11:22:59: SocketListener pending INFD : 17/03/2010 11:22:59: SocketListener pending INFD : 17/03/2010 11:22:59: Waiting for a connection INFD : 17/03/2010 11:22:59: Waiting for a connection INFD : 17/03/2010 11:22:59: Sorry, no connection requests have arrived INFD : 17/03/2010 11:22:59: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INFD : 17/03/2010 11:23:00: Success BeanNetwork.The site record found successfully in the UserCustomDB PAN_ID= 2012 MAC_ID= 0158D 00000A9C72 INFD : 17/03/2010 11:23:01: Success BeanSensor:The site record found successfully in the UserCustomDB PAN_ID= 2012 MAC_ID= Stop Refresh	1 2012 192.168.0.250	
INF0 : 17/03/2010 11:22:59: Server starting INF0 : 17/03/2010 11:22:59: Server started INF0 : 17/03/2010 11:22:59: SocketListener pending INF0 : 17/03/2010 11:22:59: SocketListener pending INF0 : 17/03/2010 11:22:59: Waiting for a connection son 0.0.0.0 on port number 5313 INF0 : 17/03/2010 11:22:59: Waiting for a connection INF0 : 17/03/2010 11:23:00: Clent 1 accepted INF0 : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INF0 : 17/03/2010 11:23:00: Sorry, no connection requests have arrived INF0 : 17/03/2010 11:23:00: ACK: Finished Initializing Platform PAN_ID= 2012 Session ID INF0 : 17/03/2010 11:23:01: Success BeanGateway: The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000048405 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= 0015800000049C72 INF0 : 17/03/2010 11:23:01: Success BeanSensor. The site record found successfully in the UserCustomDB = PAN_ID= 2012 MAC_ID= Stop = Refresh		
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This window is the **BeanScape®** control server.

I am not able to see the BeanGateway[®] status on the left side pane, why?

Check the bottom left server status **BeanScape®**.

"Status" means that the server is not running.

- \circ $\;$ Check the Ethernet connection. (Network and Cable settings)
- \circ $\hfill\hfilt$
- $\circ \quad \text{Make sure that the LED flashes}$

11. TROUBLESHOOTING BEANGATEWAY®: FAQ

o Restart the server



12. ENVIRONMENTAL CONSTRAINTS

12.1 SEALING

BeanGateway[®] 4G Outdoor product is provided with a protection rating *IP66*. Do not place the BeanGateway[®] in a maritime environment with high turbulence. Avoid accumulation and infiltration of water through the front cover of the BeanGateway[®] 4G casing. Tighten all connections that may interfere with the seal.

12.2 SENSITIVITY TO RADIO FREQUENCY

For further information, please refer to the application note: AN RF 007 : "Beanair WSN Deployment"

12.3 TEMPERATURE

The BeanGateway[®] 4G operating temperature is -15°C to 50°C

It is recommended not to exceed these ranges. This could permanently damage the BeanGateway[®] 4G.

12.4 HUMIDITY

BeanGateway[®] 4G can operate in a 90% humid environment.

However, the IEEE 802.15.4 radio waves may deteriorate in the presence of water. Avoid placing the **BeanGateway® 4G** in an enclosure surrounded by water, almost bushy plants (plants are composed of 90% water).

12.5 REFLECTIONS, OBSTRUCTIONS AND MULTIPATH

For further information, please refer to the application note: <u>AN_RF_007 : "Beanair_WSN_Deployment"</u>

12.6 SHOCKS AND VIBRATIONS

BeanGateway[®] **4G** can withstand the shocks of intensity exceeding 2g. Avoid dropping the **BeanGateway**[®] **4G**. Secure the **BeanGateway**[®] **4G** to a wall or a pole.

Do not force on the connections.

12.7 ANTENNA

Depending on the type of antenna (omnidirectional, bidirectional), orient it in a particular position so that the emitted field is optimal. (See field emission 1.2.1)

When you move the **BeanGateway® 4G**, make several tests by changing the orientation of the antenna and get the best arrangement.

For further information, please refer to the application note: <u>AN_RF_007 : "Beanair_WSN_Deployment"</u>

12.8 OTHER FEATURES

While having the highest **BeanGateway® 4G** possible transmission and receive over a wide area.

Do not take off the blue labels pasted on **BeanGateway® 4G** products

13. APPENDICES

13.1 APPENDICE 1: WHICH SIM CARD TO USE?

On your BeanGateway[®] 4G, using a SIM card with dynamic public IP will not be a problem. We suggest a data SIM card dedicated to M2M application.

If you are not sure that your ADSL Modem running at the office will come with a Public fixed IP, you should use a 4G Router with a 4G Data SIM Card with fixed PUBLIC IP:

- For UK customers: <u>Click on the following weblink</u>
- For German customers: Click on the following weblink





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Beanair GmbH