Product Specification

Product Name: L-Serial Smart Gateway
Model Name: DSGW-040

Revision History

Specification		Sect.	Update Description	By
Rev	Date			
1.0	2020-01-30		New version release	
2.0	2020-05-29		Add Cat1 version, update the Bluetooth to 5.2 version	
3.0	2020-06-02		Add Li battery	
4.0	2020-06-20		Add application select table	
5.0	2020-07-09		Add different country with different Z-WAVE frequency	
6.0	2020-07-13		Change the Z-wave default frequency to 916M	
7.0	2020-09-09		Add a new type DSGW-040-9	
8.0	2020-09-16		Correct some errors	
9.0	2020-09-21		Add a new type DSGW-040-11	
A.0	2020-10-19		Add free space	
B.0	2020-11-19		Add a new type 040-13	
C.0	2020-12-03		Add BQB Certification	
D.0	2021-01-22		Add a new Type DSGW-14	
E.0	2021.04.16		Add a new Type -15	
F.0	2021-11-09		Adding Healthcare Application	
G.0	2022-5-27		Adding description of self-destruction function of products with lithium battery	
G.1	2022-8-25		Adjust temperature parameter and LTE China	Li
G.2	2022-11-25		Add new type	Li

Approvals

Organization	*Name*	*Title*	*Date*

杭州市大关路189号万通中心 A幢8 楼,310004 Floor 8, building A, Wantong center,
Tel:86-571-86769027/8 8810480 Hangzhou 310004, China
Website: www.dusuniot.com www.dusunremotes.com www.dusunlock.com

Contents

Model list

Model \ feature	Wi-Fi 2.4G	Bluetooth 5.2	Zigbee3.0	Z-Wave	LTE Cat M1	LTE Cat1	Li battery
DSGW-040-1	●	●					
DSGW-040-2	●	●			●		
DSGW-040-3	●		●				
DSGW-040-4	●		●		●		
DSGW-040-5	●			●			
DSGW-040-6	●			●	●		
DSGW-040-7	●	●	●	●	●		
							以下为电池款
DSGW-040-8	●	●				●	
DSGW-040-9	●	●	●		●		
DSGW-040-10	●	●	●		●		
DSGW-040-11	●	●	●	●	●		●
DSGW-040-12	●	●			●		●
DSGW-040-13	●	●		●	●		●
DSGW-040-14	●	●	●	●			
DSGW-040-15	●		●			●	
DSGW-040-16	●		●			●	●
DSGW-040-17	●	●	●		●		●

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Website: www.dusuniot.com www.dusunremotes.com www.dusunlock.com

Floor 8, building A, Wantong center,
Hangzhou 310004, China

1. Introduction

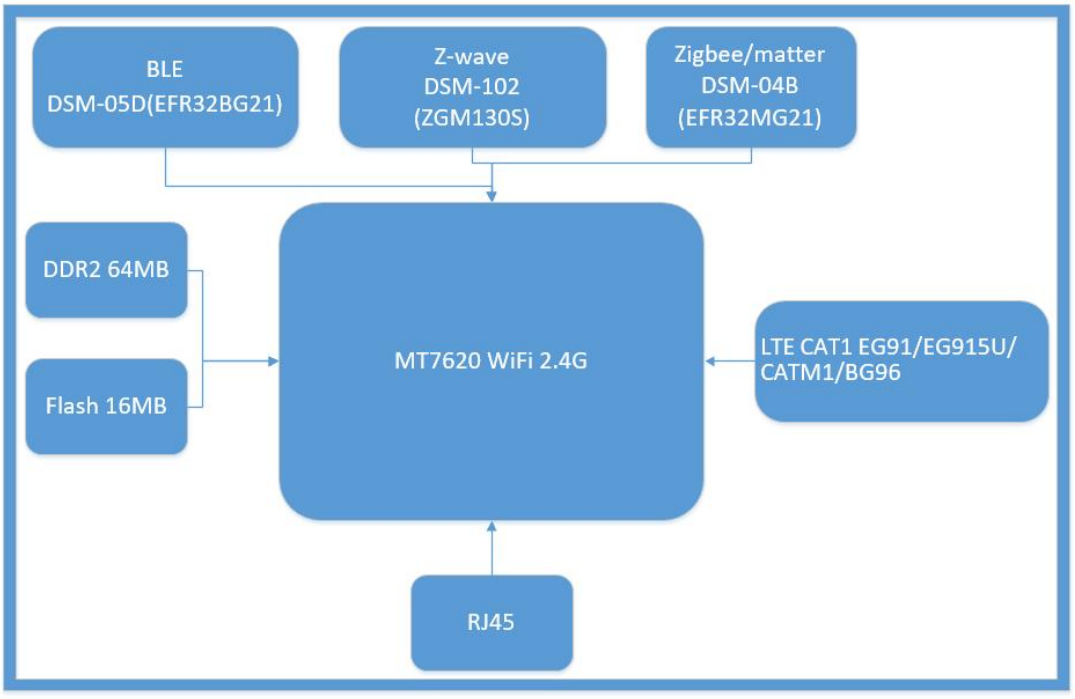
1.1 Purpose& Description

It is a smart Gateway with DC power supply. It can convert IoT wireless device data into a network protocol. It can be used in various scenarios flexibly. It can control BLE5.2 and zigbee3.0 device remotely, receives the data sent by the BLE5.2 and zigbee3.0 devices and sends it to servers. The Wi-Fi data rate can be up to 300Mbps and BLE data rate can be up to 2Mbps. It can also supports the 5V adapter power supply，It reserves the ZigBee3.0 function ,Z-WAVE,4G LTE function.

1.2 Product Feature Summary

- Support 5V adapter power supply
- Support IEEE802.11ac,IEEE802.11n,IEEE802.11g,IEEE 802.11b Protocol
- Support LTE CAT1, LTE CAT M1
- RAM: 64MB （Can be upgraded to 128M） Free Space：16MB （if RAM128M,Free Space is 80M）（development Space for user）
- Flash: 16MB Free Space：8MB （development Space for user）
- Support Bluetooth 5.2
- Support ZigBee3.0
- Support Z-WAVE
- One WAN，One LAN network port
- Backup Li battery (optional)

1.3 Hardware block diagram



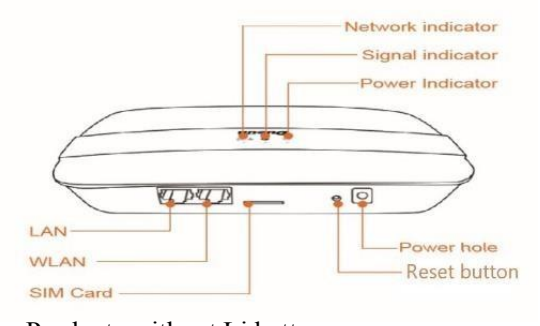
2. Mechanical Requirement

2.1 Drawings

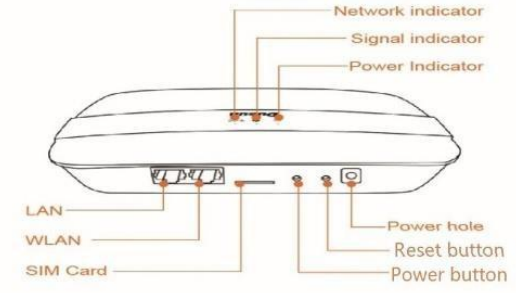
Products without Li battery

Products with Li battery

2.2 Interface



Products without Li battery



Products with Li battery

2.3 Item list

Power Adapter
Network Cable
Gateway

3. Specifications

3.1 Technical Specification

Category	Specifications
Power Supply	Support DC Input, input Voltage range is 4.5V to 5V. Power seat aperture is 3.5mm. The needle diameter is1.35 mm and is positive. Power adapter：100-240V 50/60HZ， Output is 5V/2A
Reset button	The reset button is hole button, after pressing the reset button for more than 5 seconds, the Gateway will be restored to the factory settings.
Power button	Products with Li Battery have self-locking fuction. The battery status is ensured through the self-locking switch hole. Only by poking the self-locking switch hole can the gateway work, even when the power supply is connected.
Network Interface	WLAN/LAN port
Indicator LEDs	1).Power LED normally on when powered on 2).Zigbee/BLE/Z-WAVE LED is flash when the signal come 3).Wi-Fi LED normally on after connecting to Wi-Fi for 1-2 sec
Li battery	4100mAH (It can last 4 hours without DC power)
Operating Temperature	-10℃~55℃
Storage Temperature	-40℃~65℃
Current	350mA@5V

3.2 Performance Requirement

Wi-Fi Performance	• IEEE wireless LAN standard: IEEE802.11n; IEEE802.11g; IEEE 802.11b • Data Rate: • IEEE 802.11b Standard Mode:1,2,5.5,11Mbps • IEEE 802.11g Standard Mode:6,9,12,18,24,36,48,54 Mbps IEEE 802.11n: MCS0~MCS7 @ HT20/ 2.4GHz band • MCS0~MCS7 @ HT40/ 2.4GHz band • Sensitivity: • HT40 MCS7: -70dBm@10% PER(MCS7) /2.4GHz band HT20 MCS7: -71dBm@10% PER(MCS7) /2.4GHz band • Transmit Power: • IEEE 802.11n: 16dBm @HT20/40 MCS7 /2.4GHz band IEEE 802.11g: 16dBm @54MHz • IEEE 802.11b: 18dBm @11MHz • Wireless Security: WPA/WPA2, WEP, TKIP, and AES • Working mode : Bridge、Gateway、AP Client • Range: 50 meters minimum, open field • Transmit Power:17dBm

	• Highest Transmission Rate: 300Mbps • Frequency offset: +/- 50KHZ • Frequency Range (MHz): 2412.0~2483.5 • Low Frequency (MHz):2400 • High Frequency (MHz):2483.5 • E.i.r.p (Equivalent Isotopically Radiated power) (mW)<100mW • Bandwidth (MHz):20MHz/40MHz • Modulation: BPSK/QPSK, FHSSCCK/DSSS, 64QAM/OFDM
Zigbee Performance	• TX Power: 17.5dBm • Range: 100 meters minimum, open filed • Receiving Sensibility: -94dBm • Frequency offset: +/-20KHZ • Frequency Range (MHz):2401.0~2483.5 • Low Frequency (MHz):2400 • High Frequency (MHz):2483.5 • E.i.r.p (Equivalent Isotopically Radiated power) (mW)<100mW • Bandwidth (MHz):5MHz • Modulation: OQPSK
Bluetooth-Performance	• TX Power: 19.5dBm • Bluetooth: 19.5dBm • Range: 150 meters minimum, open filed • Receiving Sensibility: -80dBm@0.1%BER • Frequency offset: +/-20KHZ • Frequency Range (MHz):2401.0~2483.5 • Low Frequency (MHz):2400 • High Frequency (MHz):2483.5 • E.i.r.p (Equivalent Isotopically Radiated power) (mW)<10mW • Bandwidth (MHz):2MHz • Modulation: GFSK
LTE Cat M1	• Operation Frequency Band: 850/900/1800/1900MHZ • Global: LTE: FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28 • North America: LTE TDD: B2/B4/B12/B13 • LTE TDD:B39(for cat.M1 only)

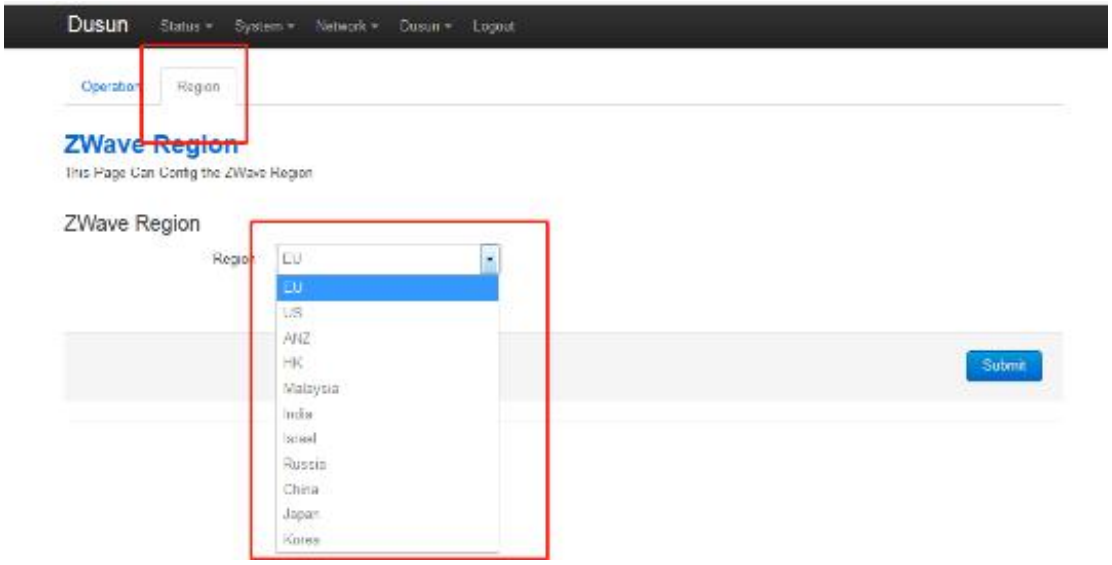
LTE CAT1 EG915-U CN	• LTE-FDD: B1/B3/B5/B8; • LTE-TDD: B34/B38/B39/B40/ • B41; GSM: B3/B8 • LTE-FDD: B1/B3/B5/B7/B8/B20/ • B28; GSM: B2/B3/B5/B8 • LTE-FDD: B2/B3/B4/B5/B7/B8/ • B28/B66; GSM: B2/B3/B5/B8
LTE CAT1	• -E（欧洲）LTE-FDD: B1/B3/B7/B8/B20/B28A; WCDMA: B1/B8; GSM: B3/B8 • -EX（欧洲）LTE-FDD: B1/B3/B7/B8/B20/B28; WCDMA: B1/B8; GSM: B3/B8 • -NAXD（北美）LTE-FDD: B2/B4/B5/B12/B13/B25/B26; WCDMA: B2/B4/B5 • -NA（北美）LTE-FDD: B2/B4/B5/B12/B13 ; WCDMA: B2/B4/B5 • -NAX（北美）LTE-FDD: B2/B4/B5/B12/B13/B25/B26 ; WCDMA: B2/B4/B5 • VX (Verizon) LTE-FDD: B4/B13 • -AUX（拉丁美洲 /ANZ) LTE-FDD: B1/B2/B3/B4/B5/B7/B8/B28/B66; WCDMA: B1/B2/B5/B8; GSM: B2/B3/B5/B8
Z-wave Performance	• TX power up to13dBm (20mW) • RX sensitivity: @100kbps-97.5dBm • Range: 100 meters minimum, open filed • Default Frequency: 916MHz(Different country with different frequency) Pls check the z-wave frequency band table
WAN/LAN	10/100M bps
RF Factory Test Mode	Setting the Board into the test mode, using the lqexl-ws that can test the Wi-Fi, Zigbee, Bluetooth, LTE. Please refer to the DUSUN Test Specification for details.

3.3 Z-WAVE Frequency band table

COUNTRY/REGION	STANDARD	Z-WAVE FREQUENCY
Argentina	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Armenia	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Australia	AS/NZS 4268	919.80 MHz, 921.40 MHz
Bahamas	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Barbados	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Bermuda	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Bolivia	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Brazil	ANATEL Resolution 506	919.80 MHz, 921.40 MHz
British Virgin Islands	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Canada	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Cayman Islands	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
CEPT*	EN 300 220	868.40 MHz, 869.85 MHz
Chile	FCC CFR47 Part 15.249	919.80 MHz, 921.40 MHz, 921.42 MHz
Colombia	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Costa Rica	ARIB T96, ARIB STD-T108	922.50 MHz, 923.09 MHz, 926.30 MHz
Ecuador	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Egypt	ETSI EN 300 220	868.40 MHz, 869.85 MHz
El Salvador	AS/NZS 4268	919.80 MHz, 921.40 MHz
EU	EN 300 220	868.40 MHz, 869.85 MHz
French Dept. of Guiana	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Guatemala	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Haiti	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Honduras	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Hong Kong (China)	HKTA 1035	919.80 MHz
India	CSR 564 (E)	865.20 MHz
Indonesia	ETSI EN 300 200	868.40 MHz, 869.85 MHz
Israel		916.00 MHz
Jamaica	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Japan **	ARIB STD-T108	922.50 MHz, 923.90 MHz, 926.30 MHz
Jordan	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Kazakhstan	ETSI EN 300 220	868.40 MHz, 869.85 MHz

Lebanon	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Libya	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Malaysia	SKMM WTS SRD/ETSI 300 220	868.10 MHz
Mauritius	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Mexico	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
New Zealand	AS/NZS 4268	921.40 MHz, 919.80 MHz
Nicaragua	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Nigeria	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Panama	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Paraguay	AS/NZS 4268	919.80 MHz, 921.04 MHz
Peru	AS/NZS 4268	919.80 MHz, 921.40 MHz
Qatar	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Russian Federation	GKRCh/ETSI 300 220	869.00 MHz
Saudi Arabia	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Singapore	TS SRD/ETSI 300 220	868.40 MHz, 869.85 MHz
South Africa	ICASA/ETSI 300 220	868.40 MHz, 869.00 MHz
Republic of Korea	Clause 2, Article 58-2 of Radio Waves Act	920.90 MHz, 921.70 MHz, 923.10 MHz
St Kitts & Nevis	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Suriname	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Taiwan (China)	NCC/LP0002	922.50 MHz, 923.90 MHz, 926.30 MHz
Trinidad & Tabago	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Turks & Caicos Islands	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
UAE	ETSI EN 300 220	868.40 MHz, 869.85 MHz
Uruguay	AS/NZS 4268	919.80 MHz, 921.40 MHz
USA	FCC CFR47 Part 15.249	908.40 MHz, 916.00 MHz
Yemen	ETSI EN 300 220	868.40 Hz, 869.85 MHz

Setting the corresponding z-wave frequency band according to the <<Development user manual>>



4. QA Requirements

4.1 Quality and Testing Information

Information Description	Standard(Yes) custom(No)
ESD Testing	Yes
RF Antenna Analysis	Yes
Environmental Testing	Yes
Reliability Testing	Yes
Certification	FCC, CE, Zigbee, Bluetooth(BQB), RoHs
Operate temperature	-5℃~65℃

5. Software requirement

This software will be based on MTK platform. It runs on the OpenWrt system. And the Features:

- Wi-Fi
- Zigbee3.0
- Bluetooth 5
- Z-Wave
- LTE
- OTA
- MQTT

5.1 Defines

5.1.1 Boot up

When insert the power , The green and yellow Led are lighting, the Yellow LED is go out and the green LED is blink,

the green led is lighting, the gateway boot up successfully.

5.1.2 Reset

Keep pressing the button for 5s. All matching information is eliminated.

5.1.3 Indicator LED

- **Green LED**: it is used to indicate system startup
- **Yellow LED**: it is used to indicate the operating the Zigbee and z-wave. When the gateway communicate with sensor,
- the led will be blink. If let the gateway go into pairing mode, the led will be blink.
- **Red LED**: it is used to indicate gateway connect with cloud, if the gateway connect with successfully, the Red LED is go out, failed is lighting.

5.2 Wi-Fi Configuration

The Wi-Fi support the AP mode and client mode. It can be switched.

The name of AP : xxxxxxx

Pass word : xxxxxxx

5.3 ZigBee Configuration

The Zigbee stack is version 3.0, it can support ZHA, Greenpower, ZLL, ZSE etc.
It support most cluster of ZigBee devices. Like door sensor, leakage sensor, Motion sensor, Tem&Hum sensor, smart plug,

Smart lamp, smoke sensor, curtain etc. It can used web or command to add the device.

5.4 Bluetooth Configuration

The Bluetooth is core 5.0, it supports BLE 5. It can used web or command to add the device.

5.5 Z-Wave Configuration

Z-Wave is a standard module, it support most cluster of z-wave devices. It can used web or command to add the device.

5.6 LTE Configuration

The gateway power on , the LTE will set up , and check if there is a sim card, then scan the network and join it. It can used the web or command to change the APN to adapt to different countries.

5.7 OTA

The gateway can be upgradeable over the network.

5.8 MQTT

The gateway support the MQTT protocol to connect the cloud.

6. Application Scenarios

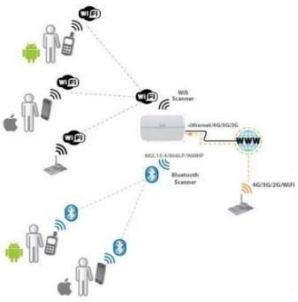
Application NO	Function Introduction	Model Name	Firmware Version
AP-01	WI-FI and Bluetooth Scanner	DSGW-040-2	DSGW-040-2-Vesion1.0
AP-02	Work with Beacon for Indoor Positioning	DSGW-040-3	DSGW-040-3-Vesion1.0
AP-03	Smart Home IOT	DSGW-040-7	DSGW-040-7-Vesion1.2
AP-04	Bluetooth roaming function provides remote health guidance	DSGW-040-8	DSGW-040-8-Verision1.1

Application List

6.1 AP-01 Monitor Shopping and Street Activity

The smart gateway can be used to detect iPhone and Android devices, which can be detected without the need of being connected to an specific Access Point, enabling the detection of any smartphone, laptop or handsfree device which comes into the coverage area of this smart gateway and in general any device which works with Wi-Fi or Bluetooth interfaces. Users have to do nothing to be detected as the WIFI and Bluetooth radios integrated in their smartphones.

Working Scenario



Schematic Diagram

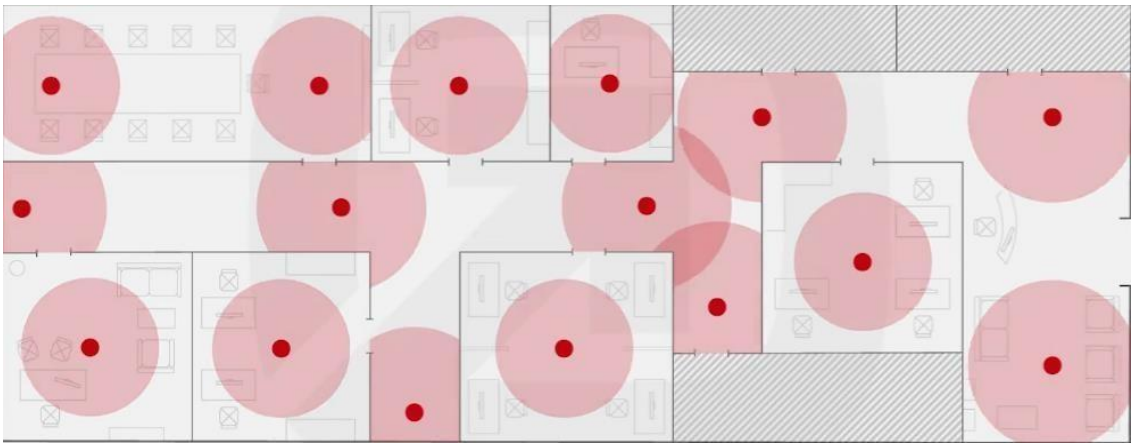
DB ID	Timestamp	MAC	AP	RSSI	Vendor
53483	2012-04-24 07:56:25	C4:2C:03:96:0E:4A		69	Apple
53482	2012-04-24 09:11:26	D8:2A:7E:10:1E:63	libelium_wsn1	60	Nokia Corporation

Example of information monitored by the WIFI Scanner

DB ID	Timestamp	MAC	ID	RSSI	CoD	Vendor
45400	2012-05-16 16:18:12	00:26:7E:5F:3C:18	myCar	-72	Handsfree	PARROT SA
78005	2012-04-20 12:59:27	D8:2A:7E:0E:C3:10	Tropic	-85	Smartphone	Nokia Corporation

Example of information monitored by the Bluetooth Scanner

6.2 AP-02 Beacons for Indoor guidance and locatio



Exemplary deployment of a beacon infrastructure

The beacon attached to the asset to be tracked sends BLE signals to Smart Gateway that are installed in the building. The Gateway processes the provided data and sends it via Wi-Fi, Ethernet to Server. Here, the position is displayed on a map and motion statistics can be retrieved.

6.3 AP-03 Smart Home IOT

The Smart Gateway Working Scenario

The Smart Gateway as the brain of the smart home connects wirelessly with a wide range of smart devices and make them work together.

- Control lights, electronics, and small appliances from anywhere.
- Set devices to turn on and off at different times of day.
- Receive alerts when there’s unexpected activity in your home.
- Set connected lights to turn on and off as people come and go.
- Monitor moisture and temperature.

6.4 AP-04 Healthcare

Health medical equipment can be connected to the cloud platform through the gateway to send health and medical data remotely, and doctors can remotely provide medication guidance to patients with chronic diseases

The gateway has Bluetooth roaming function. In a large area, the device can connect from gateway A to gateway B through Bluetooth roaming

FCC Statement

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

To comply with RF exposure requirements, a minimum separation distance of 20 cm must be maintained between the user’s body and the device, including the antenna.