DS0052V Cellio LTE BLE Gateway User Manual

DS0052V
User Manual 06/03/2021

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1. FCC/ISED Statements

FCC Interference Statement

Changes or modifications not expressly approved by Device Solutions could void the user's authority to operate this 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.

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

This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

For body worn operation, this device has been tested and meets FCC RF exposure guidelines. When used with an accessory that contains metal may not ensure compliance with FCC RF exposure guidelines.

This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

ISED (Canada) Notice

The device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

To comply with RSS 102 RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.

Cet appareil est conforme aux normes d'exemption de licence RSS d'Industry Canada. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas causer d'interférence, et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

2. Introduction

This user manual describes the Cellio LTE ISM 915 Bluetooth Enabled Gateway:

- I/O pinout of the IP67 male DB9 connector
- Bluetooth Low Energy (BLE) sensor connectivity procedure to enable connections between the Gateway and BLE sensors
- Instructions for using the Cellio Bluetooth App.

For initial Gateway deployment, it is not required to open the Gateway to connect the internal battery. The default factory configuration automatically enables the internal battery connection once external power is applied for the first time.

3. Supported Connections

The Gateway can connect to supported IOT sensors in three ways (refer to Figure 1), via:

- ISM 915 MHz wireless connection to a compatible Cellio ISM 915 MHz Transceiver which is directly wired to sensors which support the specification of the I Cellio ISM 915 MHz Transceiver I/O. Refer to the Cellio Transceiver datasheets for supported I/O.
- Gateway DB9 wired connection to sensors which support the specification of the DB9 I/O defined in the Gateway datasheet
- BLE 5.0 wireless connection to compatible sensors

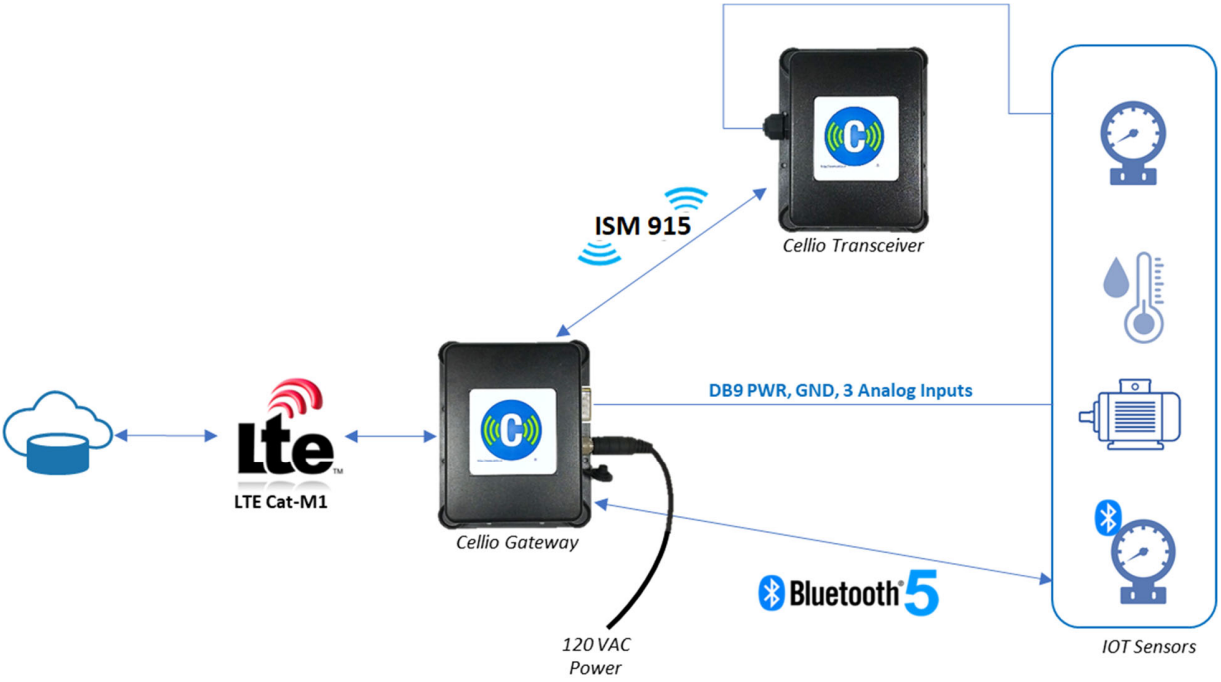

Figure 1: Three ways to Connect IOT Sensors to the Gateway

4. DB9 I/O Support and Pinout

The IP67 Gateway male DB9 connector pinout is defined in Figure 2.

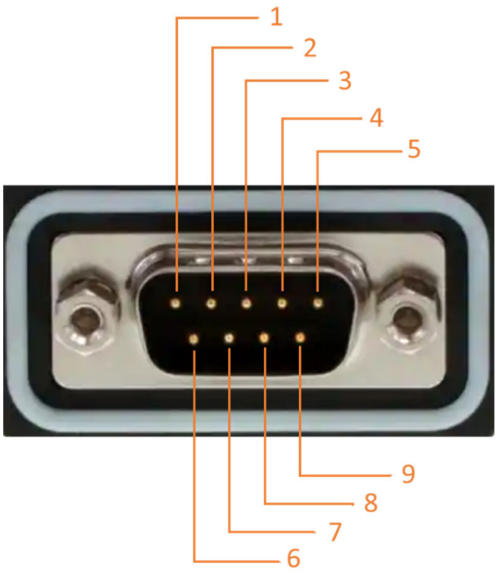

Figure 2: DB9 Pin numbering

To maintain IP67 rating, an IP67 compatible female connection must be used. The following are recommended:

- Amphenol LTW Product Number SDB-09BFFA-SL7001
- Assmann WSW Product Number A-DF09-HOOD-WP

The DB9 pins are configured as follows:

DB9 Pin	I/O Function	Sensor Report Default Mapping*
1	**VEXT_5.0**	
2	**Analog Input**	**Sensor Report 2, reading_0**
3	*Future Use*	
4	**Analog Input**	**Sensor Report 2, reading_1**
5	**GND**	
6	*Future Use*	
7	*Future Use*	
8	*Future Use*	
9	**GND**	

* Refer to “Cellio Universal Protocol” (CUP) specification for further details

5. BLE 5.0 Sensor Connection and Cellio Bluetooth App

The Gateway supports BLE 5.0 IEEE 802.15.4-2006, 2.4 GHz wireless connection to compatible sensors. Refer to the BLE sensor manufacturer's specifications for programming and to confirm how often the BLE sensors communicate with the Gateway.

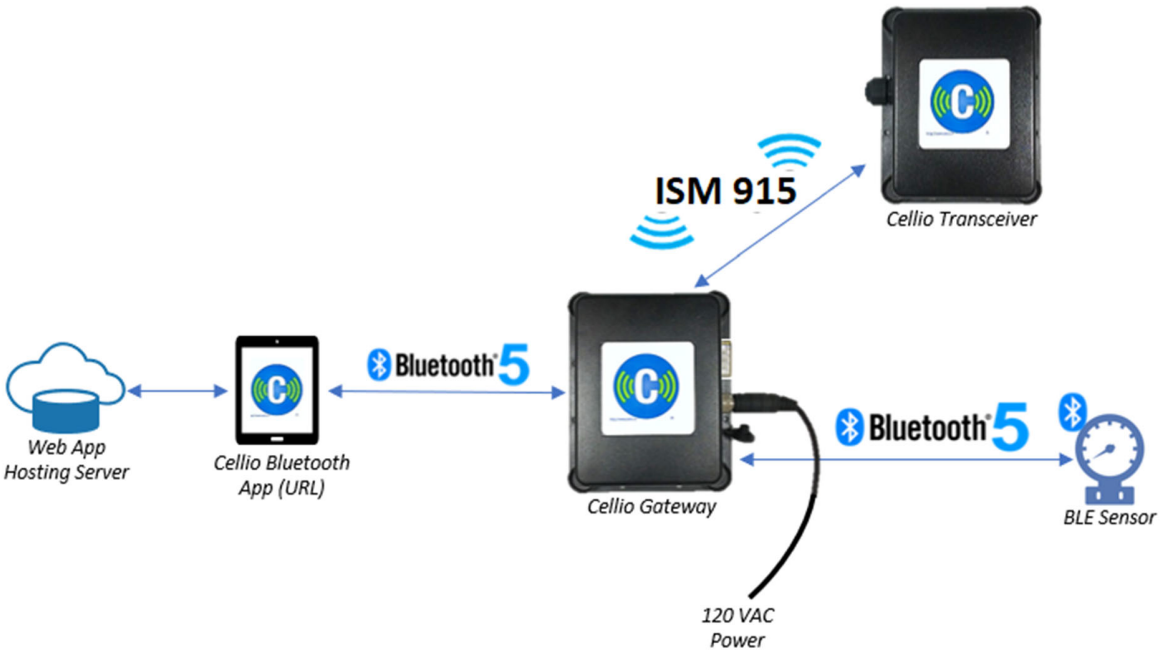

Figure 3: Cellio Bluetooth App Environment

Refer to Figure 3. The Cellio Bluetooth App is hosted on your secure server and accessed from a Bluetooth enabled device (PC, tablet, smartphone). The device must be compliant with Bluetooth 4.0 however, compliance with 4.2 with Data Length Extension (DLE) is recommended for improved throughput. Contact Cellio support to obtain the Cellio Bluetooth App. It is your responsibility to maintain valid Usernames and Passwords for login to the Cellio Bluetooth App.

Once external power is applied the Gateway will broadcast its identity as "DSGWxxxxxx" where xxxxxx is the last 6 digits of the gateway IMEI.

The following power up sequence should be followed when using the Cellio Bluetooth App to ensure all components are in the correct state for successful connections:

1. Open and login to Cellio Bluetooth App on supported device
2. Apply external power to the Gateway
3. Power up Cellio Transceivers and BLE sensors
4. Select desired Gateway from Cellio Bluetooth App

The Cellio Bluetooth App provides the following functionality (refer to Figure 4).

- Connect / Disconnect Gateway
- Select which advertised BLE Gateway with which to connect
    - Note: after disconnecting a Gateway, the Gateway must be power cycled or check in per its configuration to again be visible
- Once the Gateway is selected, the connected Gateway's IMEI, internal battery voltage, cellular signal strength indicator (RSSI), firmware versions, and timestamp of last Gateway cellular connection are displayed.
- Support Options:
    - Transceiver Range Check Mode
        - It is no longer necessary to open the gateway to enable this mode. See "Range Evaluation of 915 MHz ISM Radio for Cellio Installation DO0072 Application Note" for full operation
    - Erase Gateway Report Queue
    - Reboot Gateway
- A list of each BLE sensor or Cellio Transceiver connected to the Gateway since the last gateway reset with the following:
    - Sensor ID
    - Time elapsed (minutes) since last connection
    - Signal Strength Reading

5.1. Signal Strength Readings:

Signal strength readings should be used to optimize placement of the Gateway, Transceivers, and BLE sensors.

Cellular RSSI:

The Cellular signal strength indicator (RSSI) is listed in the Gateway status information in dBm:

- [-51 dBm (strongest) through -100 dBm] represents good signal
- [-100 dBm through -109 dBm] represents fair signal
- [-109 dBm through -113 dBm] represents marginal signal
- [-113 dBm through -140 dBm] represents poor signal

Cellio Transceiver and BLE Sensor Signal Strength:

The signal strength of each connected BLE sensor and Cellio transceiver, is listed in dBm:

- [-26 dBm (strongest) through -95 dBm] represents good signal
- [-95 dBm through -130 dBm (weakest)] represents poor signal

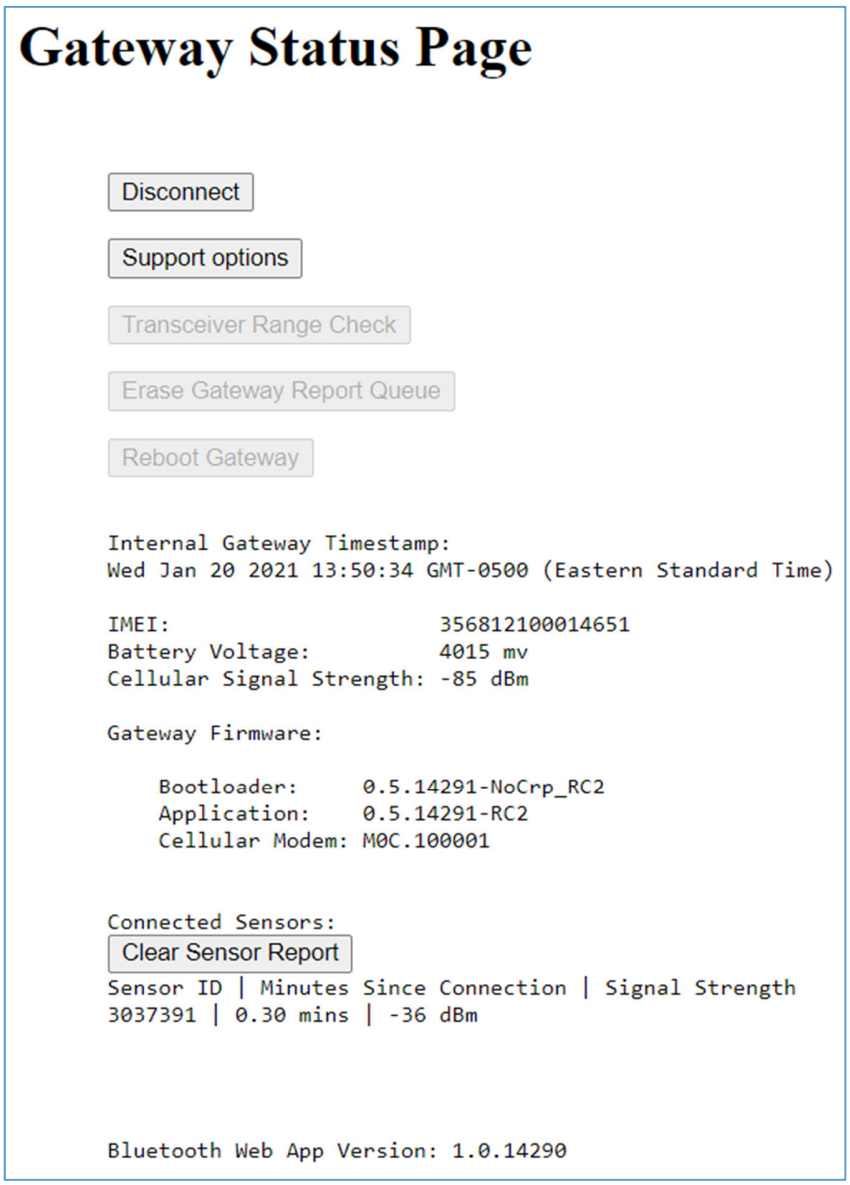

Figure 4: Sample Screen Capture of Gateway Diagnostic App

6. Support

Enter support issues into Cellio Zendesk per your established account (if applicable). Otherwise, if you do not have and established Cellio Zendesk account, email support issues to Cellio Support at support@cellio.zendesk.com.

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