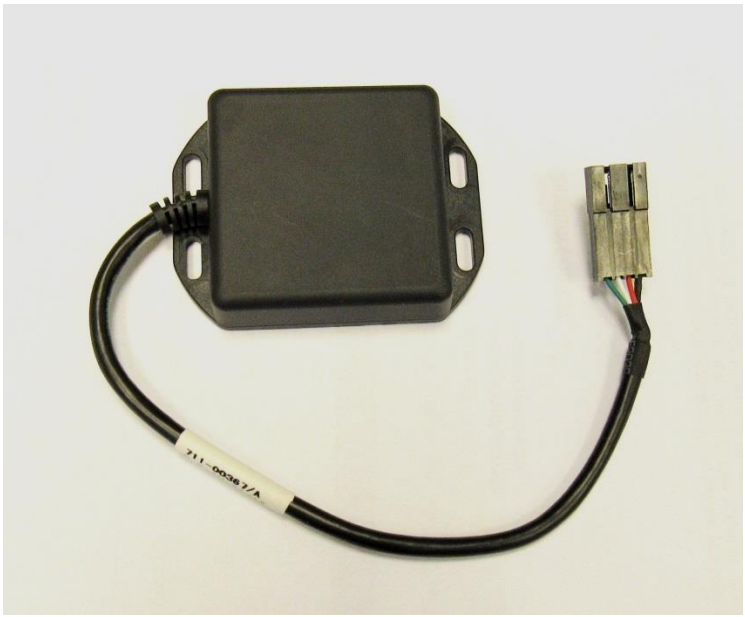
Cellocator BT Extender

Product Overview



Cellocator Division
Pointer Telocation Ltd.

Proprietary and Confidential

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POINTER

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Table of Contents

1 Introduction

1.1 Scope and Purpose

The purpose of this document is to describe the features and capabilities of the Cellocator Bluetooth Extender (BT Extender). It includes a description, installation instructions, and technical specifications of the BT Extender.

This document also describes the integration of the Cellocator unit with the sensor, in order to provide back-end Telematics applications with the information generated by the BT devices.

The document is intended for TSP or IT integrators who want to integrate Cello units with external BT devices / applications and to use the information provided by them within their Telematics applications. It is intended to provide all the required information for customers, customer support, and sales personnel.

1.2 Abbreviations

Abbreviation	Description
BT	Bluetooth
BT Classic	Bluetooth V2.x or 3.x
BLE	Bluetooth Low Energy based on V4.0 or higher
BT Smart	Supports only BLE
BT Smart Ready	Dual mode, supporting communication with Smart devices and with BT Classic devices at the same time
SPP	Serial Port Profile
ELD	Electronic Logging Devices
GATT	Generic Attributes
LoS	Line of Sight

1.3 References

All the reference documents listed in the following table can be downloaded from the Knowledge Base section of the Cellocator website.

#	Reference	Description
	CelloFamily Hardware Installation Guide	
	Harness Selection Wizard	

1.4 Revision History

Version	Date	Description
1.0	9/11/2016	Initial draft version
1.1	12/11/2016	Official version
1.2	28/11/2016	Add parameters programming in Cellocator programmer (section 4.1) Update modified enclosure picture Garmin and Apple® iAP2 profiles will be supported on future Cello FW versions (section 2.1)

2 General Description

2.1 Overview

The 715-50510 BT Extender serves as a low-cost BT Smart Ready to RS232 converter, allowing the integration of external BT devices and applications with Cello units. It supports wireless communication channels between Cello units and legacy devices that only support Bluetooth SPP or Apple® iAP2 profiles as well devices that support Bluetooth Smart, on the other side.

The BT Extender, using BLE, supports the communication channel between the Cello family and the MultiSense devices, broadening the Cello Family capabilities to include environment sensing via the MultiSense devices that create a local WSN (Wireless Sensor Network).

The BT Extender, using BT Classic, supports BT SPP or Apple® iAP2 profiles and serves as a standard BT Serial Port to RS232 adapter. It is designed to support Cello units with devices supporting BT SPP, including:

- Any device (such as a smartphone and ELDs) supporting BT SPP or Apple® iAP2 profiles and requiring Cello serial to Cellular Data Forwarding.
- Any application supporting the Cellocator wire protocol (such as the Cellocator Programmer) which has a BT SPP connection.
- Garmin Fleet-ready Navigators (such as Fleet 660 and Fleet 670) supporting Bluetooth SPP.

Note: Garmin and Apple® iAP2 profiles will be supported on future Cello FW versions.

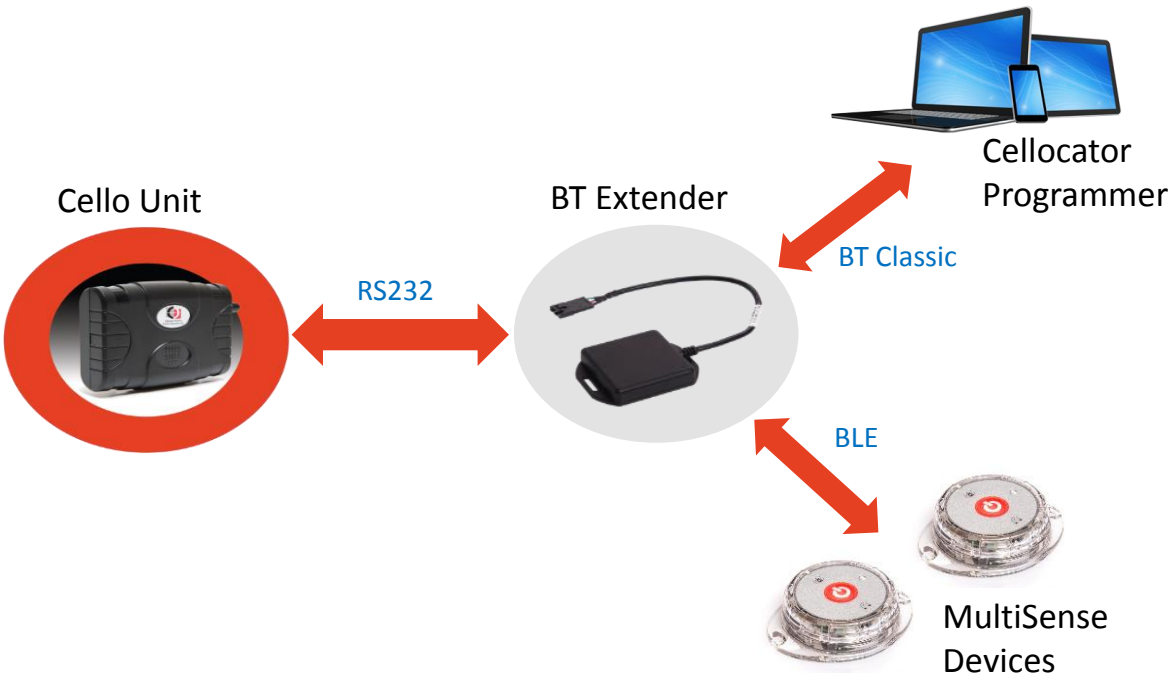


Figure 1: BT Extender Overview

2.2 Highlights

The BT Extender provides the following highlights:

- Bluetooth 4.1 Smart Ready compliant
- Simultaneous 1 x Classic + 7 x BLE connections
- Bonding unfamiliar devices via pairing process
- Communication with paired devices
- Allows Cello integration with MultiSense devices
- Allows Cello communication with Cellocator Programmer via Bluetooth
- Allows Cello Transparent Mode and Data Forwarding for any device (such as a smartphone and ELDs) supporting BT SPP or Apple® iAP2 profiles

2.3 Product Description

2.3.1 *General*

The BT Extender integrates a high performance, Smart Ready Bluetooth radio with internal antenna and RS232 interface hosting in dedicated designed enclosure.

The BT Extender is fully controlled by the Cello FW via the RS232 interface and thus its features and performance can be modified in accordance with the specific Cello FW used. The BT Extender is supported by Cello FW 35g or later versions.

The BT Extender supports one Classic connection using BT 2.1, which can be paired with one device / application such as the Cellocator Programmer. The BT Extender is assigned a BT friendly name for the pairing process in a format of *BT-extnnnnnn*, where the *nnnnnn* stands for the unit ID of the attached Cello. For example: *BT-ext190004*, where *190004* is the unit number of the Cello connected to this BT Extender. The device supports the Just Works option of the Secure Simple Pairing (SSP) mechanism, which does not require a password in the pairing process.

Up to 16 MultiSense sensors are supported on one BLE connection.

The BT Extender also provides the following maintenance features:

- Remote status report, including HW and FW versions and MAC address
- Restart command, watch dog and Automatic Hardware Restart (AHR)
- Connection / disconnection detection (via keep alive mechanism) and report
- Power saving management / hibernation

In addition, the BT Extender supports vehicle (cars, trucks) environments and complies with the required regulations.

2.3.2 *Interfaces*

The BT Extender includes the following interfaces:

2.3.2.1 Serial port to Cellocator unit

- Baud rate - 115200bps
- 8 bit, 1 Stop Bit, No Parity
- True RS232 levels

2.3.2.2 Bluetooth

The Bluetooth interface supports the following:

- BT 2.1 (for BT Classic)
- BLE 4.1
- Bonding unfamiliar devices via pairing process
- Communication with paired devices
- BT classic LoS range - 10 meters
- BLE LoS range - 100 meters

- Immediate BT communication even when engine/ignition is off

2.3.2.3 Power in and GND

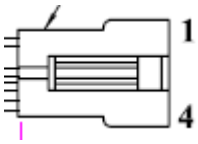
The BT Extender supports 8-32V vehicle batteries.

2.3.3 *Enclosure and Cable*

The BT Extender is housed in a dedicated designed enclosure.

The device is equipped with a 20cm, shielded, 4 wires in pigtail structure cable, terminated with a connector, which matches the communication connector of Cello harnesses.

The pin assignments of the connector are shown below.



Pin #	Wire Color	Description
1	Black	Ground
2	Red	Power
3	White	Rx
4	Green	Tx

Table 1: BT Extender Connector and Wires Description

3 Installation and Pairing

3.1 BT Extender Installation

CAUTION: To avoid possible bodily injury, or damage to the vehicle, the installer must be a certified technician who has been qualified to install the system.

The BT Extender can be installed in any vehicle cavity in which a Cello unit equipped with Cello Protector can be installed.

To install the BT Extender, connect the connector at the end of the device pigtail with the DFD connector of the appropriate Cello harness. Please review the Harness Selection Wizard for further information regarding the harnesses supporting the DFD connector.

Note: please validate that the DFD connector in the appropriate Cello harness is connected to the Battery power and not to the Ignition.

For extensive installation instructions of Cellocator products, including complete descriptions of prerequisites, preparations, recommended installation practices, recommended installation locations, forbidden installation schemes etc, please refer to the CelloFamily Hardware Installation Guide.

3.2 MultiSense pairing

In order to pair MultiSense devices with a Cello unit via the BT Extender, you have to enter the MultiSense MAC address, which is written on the MultiSense, in the MultiSense Editor window accessed via the Cellocator Programmer. You then need to configure the MultiSense properties, as described in the *Working with the Nano / MultiSense Editor* section of the Cellocator Programmer Manual.

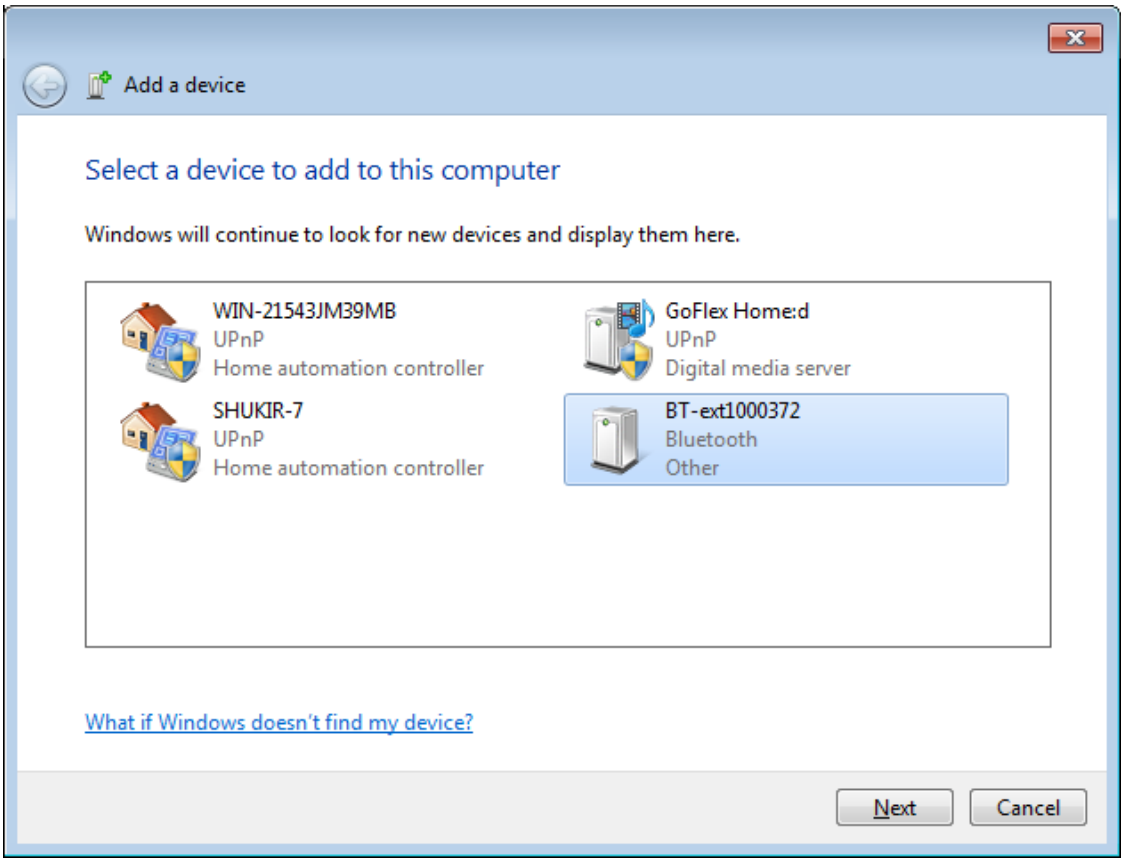
3.3 Cellocator Programmer pairing

The Evaluation Suite should be installed on a PC or laptop equipped with Bluetooth which supports BT2.1.

To pair the Cellocator Programmer with the Cello and the BT Extender perform the following steps:

1. In the Control Panel, access Hardware and Sound/Bluetooth Devices and click **Add a device**. A list of BT devices is displayed.

2. Select the BT Extender, identified by its BT friendly name which includes the Cello unit ID as shown in the picture below. No password is required.



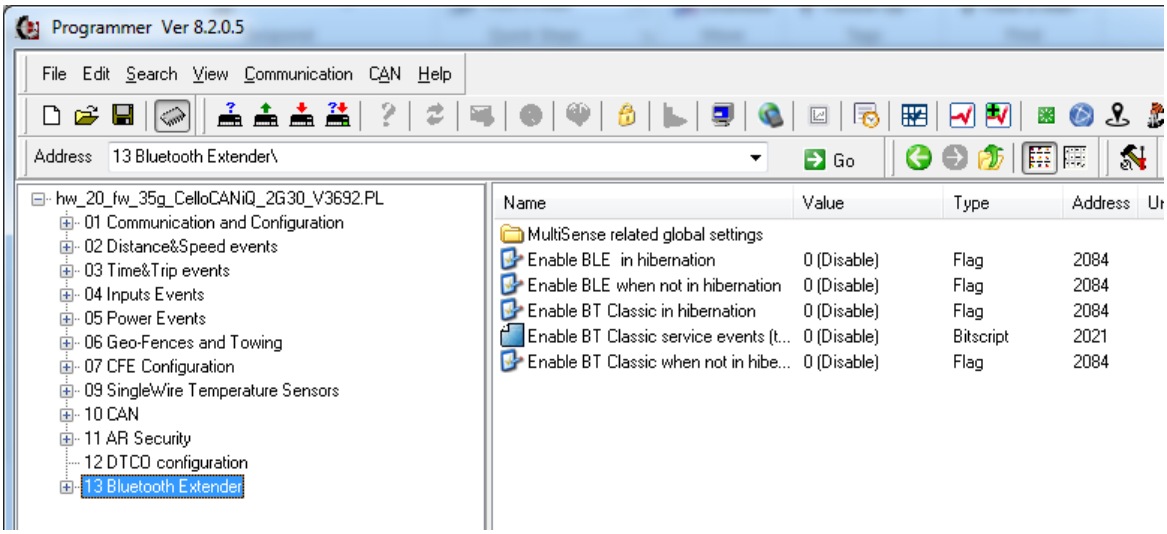
3. In the Control Panel, access Device Manager to identify the COM port assigned to the BT Extender.
4. Enter the COM Port number in the Cellocator Programmer via the *Communication* > *Configuration* menu option, as described in *Starting the Cellocator Programmer* section of the Cellocator Programmer Manual.

4 Integration Description

4.1 Cello Unit Programming

The programming parameters for the BT Extender can be found in the BT Extender section of the Cellocator Cello Programming Manual.

The BT Extender parameters are defined in the 13 Bluetooth Extender section of the Cellocator Programmer as shown in the image below.



4.2 Cello Unit Messages

The messages description and format can be found in the *Overview of CelloTrack Nano/Cello with BT Extender Messaging* and *General Definitions and Data Structures in CelloTrack Nano/Cello with BT Extender* sections in Cellocator Wireless Communication Protocol. For further information please search BT Extender in the document.

4.3 Evaluation

You may evaluate the performance and behaviour of the BT Extender and the integration of the MultiSense with a Cello unit using the k090-045 BT Extended Kit which includes 715-50100 MultiSense, 715-50200 MultiSense-TH, and 715-50510 BT Extender.

5 Technical Specifications

5.1 Specifications

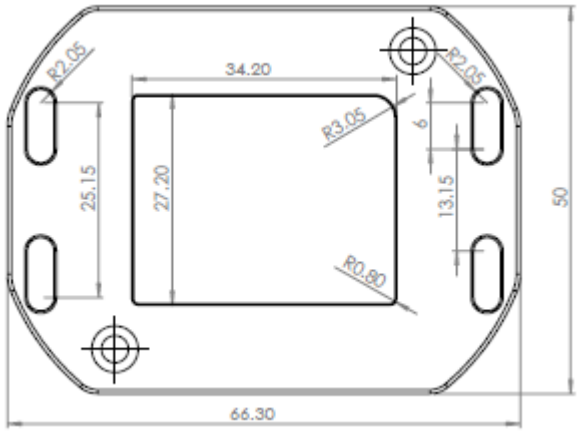
Parameter	Values
Communication	
BT specification	Bluetooth 4.1 Smart Ready Bluetooth 2.1 (Classic) Integrated antenna
Number of connections	**Bluetooth** Up to 6 x Classic connections Up to 7 x BLE connections 1 x BT Classic + 7 x BLE simultaneously **Cello** 1 x BT Classic + 1 x BLE simultaneously
LoS range	Classic BT communication - 10 meters BLE communication - 100 meters
Interfaces	
COM port (RS232)	Baud rate 115000bps 8 bit, 1 Stop Bit, No Parity True RS232 levels Cello Management Protocol External Bluetooth devices channel
Power	
Input Voltage	8-32VDC
Average Current consumption (@12V)	4 MultiSense sensors connected: < 9 mA 16 MultiSense sensors and BT classic connected: < 15 mA Hibernation: <2 mA
Environment	
Temp, operation	-30°C to +70°C
Temp, storage	-40°C to +85°C
Humidity	95% non-condensing
Ingress Protection	IP53
Regulatory Compliant	

ISO	ISO7637-2:2011 and ISO16750-2:2012 (immunity to electrical loads in the vehicle's environment in accordance with e-mark directive)
FCC	Part 15 Subpart B, part 22/24
CE	CE EMC & R&TTE according to 89/336/EEC or 1999/5/EC CE Safety EN60950-1:2001+A11:2004 Automotive Directive 2004/104/EC (E-Mark)
IC	Industrial Canada
BTSIG	BT standards
RoHS	RoHS 2 Directive 2011/65/EU
Conflict Mineral	Conflict Mineral directives
Dimensions and Weight	
Dimensions	65 x 50 x 15 mm
Weight	40 gr
Housing and Cable	
Housing material	ABS, Black
UL	Compliant
Cable length	20 cm
Cable description	Shielded black cable, which includes 4 22AWG wires (black, red, white, green) and terminated with 4 pin Molex connector.
Mounting	Two screws and/or double-sided adhesive

Table 2: Technical Specifications

5.2 Enclosure Drawings

This section includes drawings of the BT Extender enclosure.



Side View of Assembly

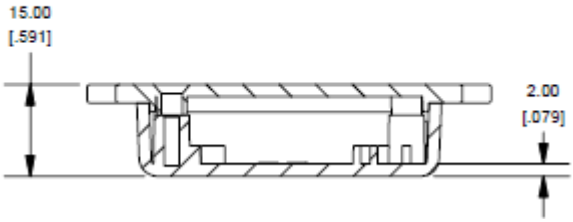


Figure 2: BT Extender Drawings (dimensions in mm)