

# u-blox GNSS Sensor Device Driver

## For Windows Location and Sensor Platform

### *User Guide*



#### **Abstract**

This document describes the use and installation of u-blox GNSS Sensor Device Driver for the Windows operating system with u-blox GNSS receivers.

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Objective Specification	Document contains target values. Revised and supplementary data will be published later.
Advance Information	Document contains data based on early testing. Revised and supplementary data will be published later.
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# 1 Introduction

Microsoft introduced with Windows 7 a built-in platform for the support of sensor devices including location sensors, such as GNSS positioning chips and modules. As part of this support, the Windows Sensor and Location Platform provides a standard way for u-blox to connect GNSS devices. At the same time, the platform gives developers a standardized API and device driver interface (DDI) to work with sensors and sensor data.

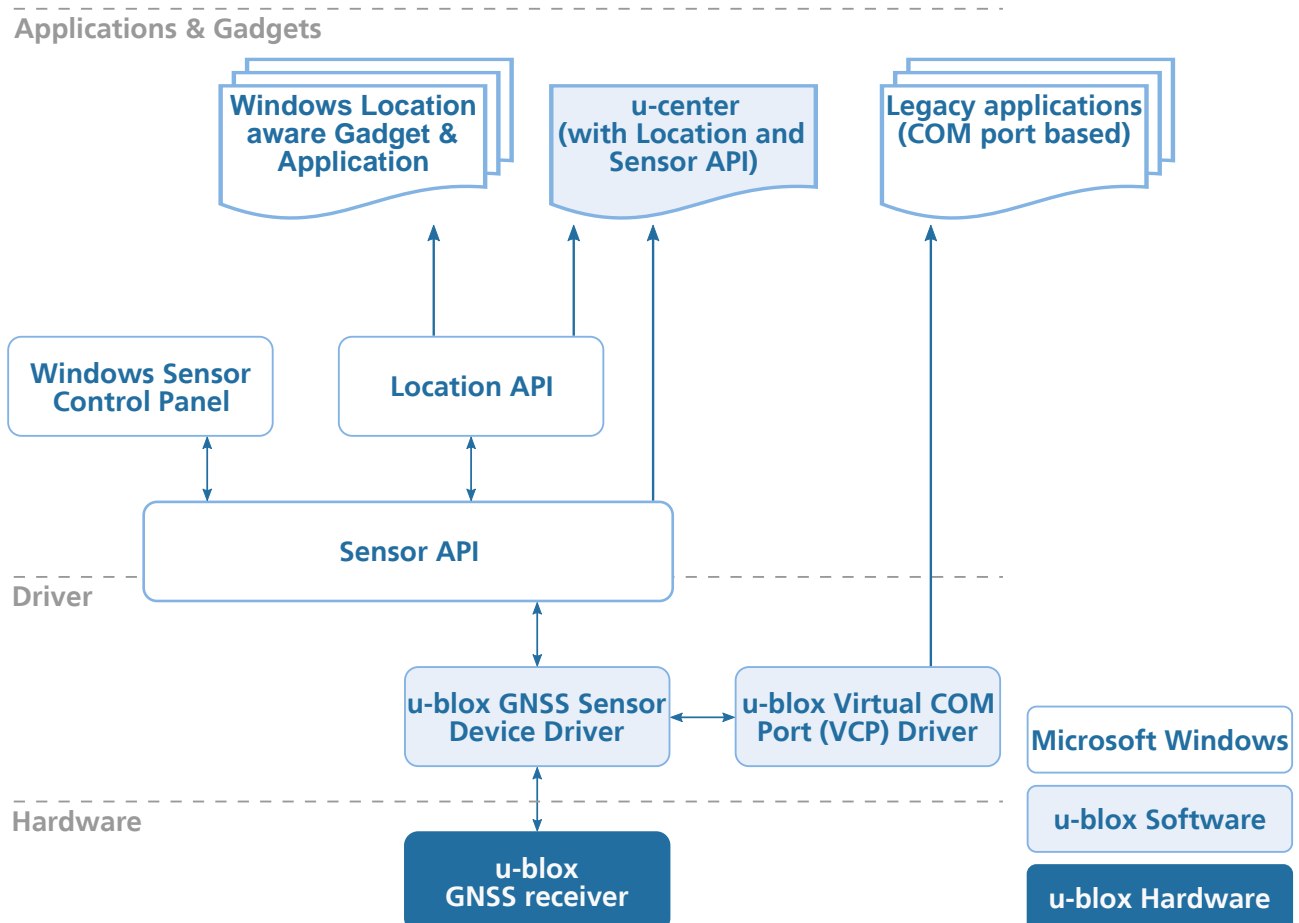
The u-blox Sensor Device Driver connects all u-blox GNSS receivers to the sensor and location API structure for Windows 7 onwards. It parses and converts u-blox GNSS messages into the standard sensor properties which can be accessed by the location and sensor APIs (see [Figure 1](#)).

## 1.1 About Location Sensor Devices

The Windows Sensor and Location platform organizes sensors into *categories*, which represent broad classes of sensor devices, and *types*, which represent specific kinds of sensors. In Windows 7 onwards, a GNSS sensor is part of the *Location* category.

## 1.2 Sensor and Location Platform Architecture

The following diagram shows the location of the different components of the Sensor and Location platform and the relationship between the u-blox components (hard- and software) and the applications:



**Figure 1: Sensor and Location Platform Architecture**

The following chapters will provide a description of the different blocks.

## 1.3 Sensor API

The Sensor API enables developers to create sensor-based programs by using a set of COM interfaces. The API defines interfaces to perform common sensor programming tasks that include managing sensors by category, type or ID, managing sensor events, working with individual sensors and sensor collections, and working with sensor data. The Windows SDK includes header files, documentation, samples, and tools to help guide software developers on how to use sensors in Windows programs. More information can be found on the [Microsoft MSDN homepage](#).

## 1.4 Location API

Built on the Sensor API, the Location API provides an easy way to retrieve data about geographic location while protecting user privacy. The Location API provides its functionality through a set of COM interfaces that represent objects. These objects can be used by programmers who understand how to use COM through programming or scripting languages. Scripting support gives easy access to location data for projects that run in the Local Computer zone, such as gadgets. The Windows SDK includes header files, documentation (including scripting reference documentation), samples, and tools to help guide Web and software developers on how to use location information in their programs.



For more information see the [Introduction to Microsoft's Sensor and Location Platform in Windows \[1\]](#).

## 1.5 Sensor Control Panel

Windows 7 includes a control panel that lets computer administrators enable or disable sensors system-wide or for each user. Because some sensors can expose sensitive data, this user interface gives administrators control over whether all programs have access to each sensor for each user. Users can also view location sensor properties and change the sensor description that is displayed in the user interface.

The Control Panel also provides a Default Location page to enable users to provide their location. When no sensor is available, the platform will use the user-provided location. Users can provide civic address fields, which include the street address, city, state or province, and country or region.



For more information see the [Introduction to Microsoft's Sensor and Location Platform in Windows \[1\]](#).

## 2 u-blox Components and Software

### 2.1 Supported u-blox GNSS Receivers

The u-blox GNSS Sensor Device Driver v2.21 supports the following u-blox GNSS receivers:

- ANTARIS 4 (ProductID = 0x01A4, VendorID = 0x1546)
- u-blox 5 (ProductID = 0x01A5, VendorID = 0x1546)
- u-blox 6 (ProductID = 0x01A6, VendorID = 0x1546)
- u-blox 7 (ProductID = 0x01A7, VendorID = 0x1546)
- u-blox M8 (ProductID = 0x01A8, VendorID = 0x1546)

### 2.2 Supported Microsoft Windows Versions

The u-blox GNSS Sensor Device Driver v2.21 supports the following version of Microsoft Windows:

- Windows 7 32- and 64-bit
- Windows 8 32- and 64-bit
- Windows 8.1 32- and 64-bit
- Windows 10 32- and 64-bit



Please note that the **N** versions of Microsoft Windows (like Windows 10 N) do not support the Sensor and Location platform. More information can be found here:

- [Description of the Windows Media Feature Pack for Windows 7 N and for Windows 7 KN \(KB968211\)](#)
- [Description of the Windows Media Feature Pack for N and KN versions of all Windows 8 editions \(KB2703761\)](#)
- [Media Feature Pack for Windows 8.1 N and Windows 8.1 KN Editions: April 2014 \(KB2929699\)](#)
- [Media feature pack for Windows 10 N and Windows 10 KN editions \(KB3010081\)](#)

### 2.3 Location Sensor

From Windows 7 onwards, u-blox GNSS positioning chips and modules are classified within the sensor part of the Location category.

### 2.4 u-blox GNSS Sensor Device Driver

u-blox has created an USB sensor driver connecting all u-blox GNSS positioning chips and modules to the Windows Sensor and Location Platform. The u-blox GNSS Sensor Device Driver conforms to Microsoft's Windows Driver Model. It is based on the Windows User Mode Driver Framework (UMDF) and supports the USB suspend mode. The driver has a Windows Hardware certification (Windows Logo Program for Hardware or WHQL).

The u-blox GNSS Sensor Device Driver parses u-blox NMEA and UBX proprietary messages [\[2\]](#) to convert latest location information (e.g. latitude, longitude, altitude) to sensor data for the location and sensor platform. Supported sensor data and properties are listed in [Appendix A](#).

### 2.5 u-blox Virtual COM Port (VCP) Driver

Beside this sensor device driver, u-blox provides a Virtual COM Port (VCP) driver to help customers connecting/testing u-blox GNSS positioning chips and modules with legacy Windows applications that can connect only to a COM port. This solution is intended to help u-blox customers to smoothly migrate their legacy location application to the Windows Location and Sensor Platform.

This driver is optional and is not required for the sensor device driver to operate correctly.

## 2.6 u-center for Windows

The u-center GNSS Evaluation Software for Windows provides a powerful platform for evaluating, configuring, testing and real-time performance visualization of u-blox GNSS products. It also provides aiding functionality.

From version 5.08 on, u-center allows collection and monitoring of location and u-blox sensor properties and data (see [Appendix A](#)). Users can access this functionality by activating either the Location API or the bidirectional Sensor API functions (see [Appendix B](#)). u-center converts sensor data and properties into NMEA and UBX-similar messages to benefit from all u-center evaluation features, and therefore all u-blox aiding, reset (e.g. warm start) and other proprietary functionalities.

The Sensor API initiates events whenever sensor data and property events are generated (like Location API functions). The bi-directional sensor API also features access to u-blox proprietary messages through the Sensor API property fields.

u-center software with location API capabilities is available free of charge from the [u-blox website](#).

## 2.7 Required Messages

Please note that the Sensor Device Driver will activate the required messages in the receiver. This makes sure that the receiver outputs the messages that are needed to extract the required information.

The following messages will be enabled by the driver:

- NMEA-GST
- NMEA-GGA
- NMEA-GLL
- NMEA-GNS
- NMEA-GSA
- NMEA-GSV
- NMEA-RMC
- NMEA-VTG
- NMEA-ZDA

## 3 Driver Installation

To use the u-blox GNSS Sensor Device Driver, you have to:

1. Install the u-blox GNSS Sensor Device Driver (see [Chapter 3.1](#))
2. Connect the device (see [Chapter 3.2](#))
3. Enable the sensor (see [Chapter 3.2](#))

To use the Virtual COM Port (VCP), you have to:

1. Install the VCP driver (see [Chapter 3.1](#))

The following sections explain the installation procedure.

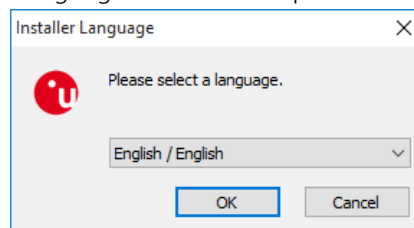
### 3.1 Driver Installation with the Installer

This section explains the installation of both the Sensor Device and Virtual COM Port (VCP) Driver with the provided installer.



If nothing else is mentioned, the screen shots are taken on a Windows 10 computer.

1. Download the [latest version of the u-blox GNSS Sensor Device Driver installer](#)
2. Double-click on the downloaded file to start the installation.
3. On the pop-up window, select the language and then accept the License Agreement.

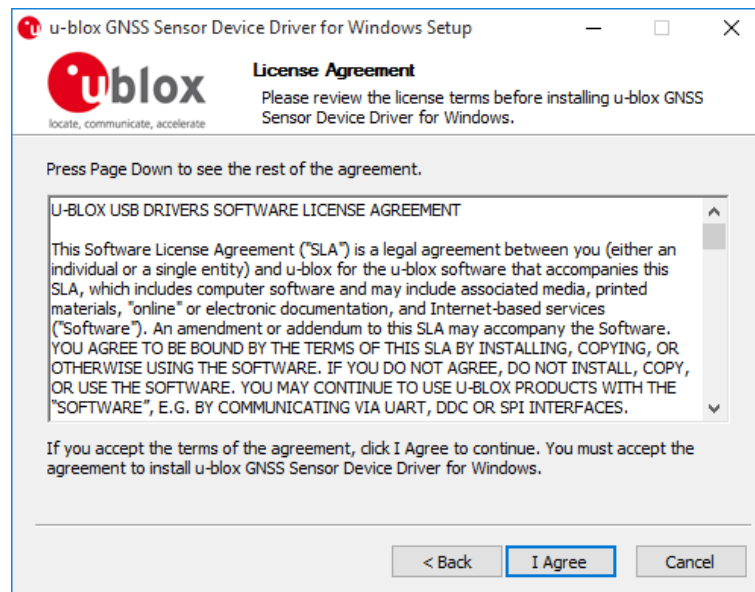


**Figure 2: Language selection**



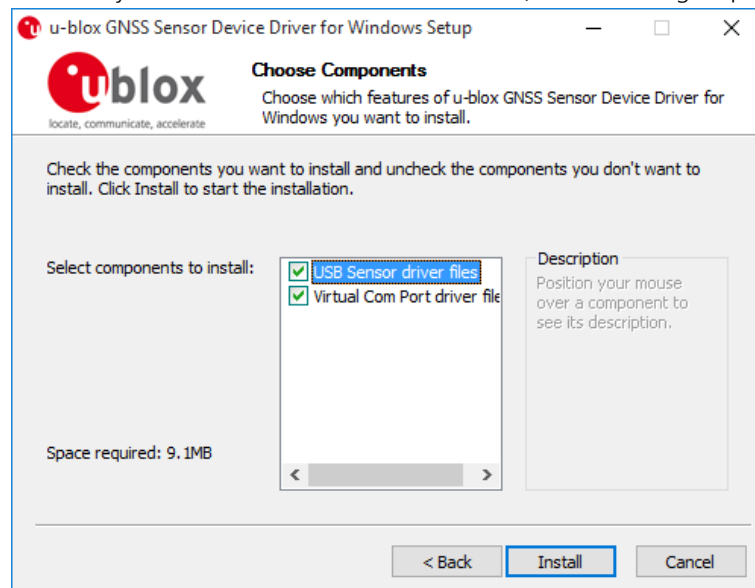
**Figure 3: Welcome message**





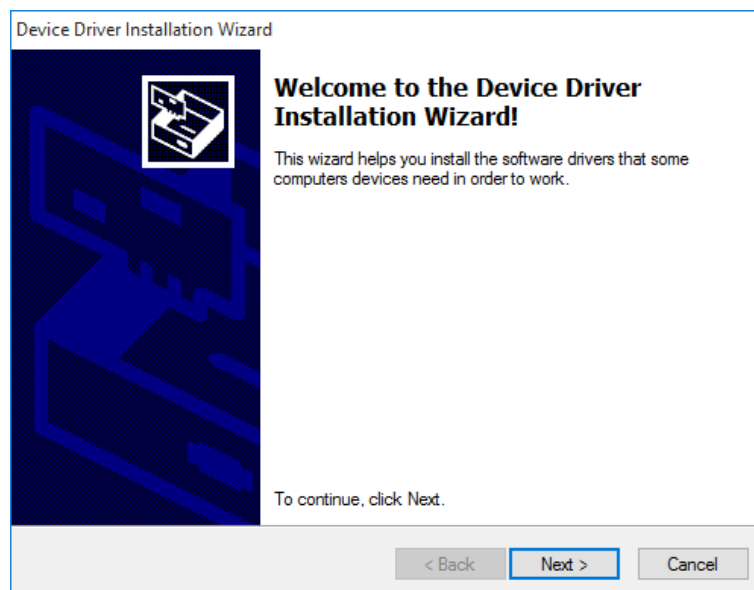
**Figure 4: License agreement**

4. On the 'Choose Components' windows - as shown below - select the driver (USB Sensor driver, Virtual COM Port driver, or both like shown on this picture) to be installed and click on the 'Install' button. When the USB Sensor driver is selected, the Device Driver Installation Wizard begins installing the USB Sensor driver first. When only Virtual COM Port driver is selected, the following step will be skipped.



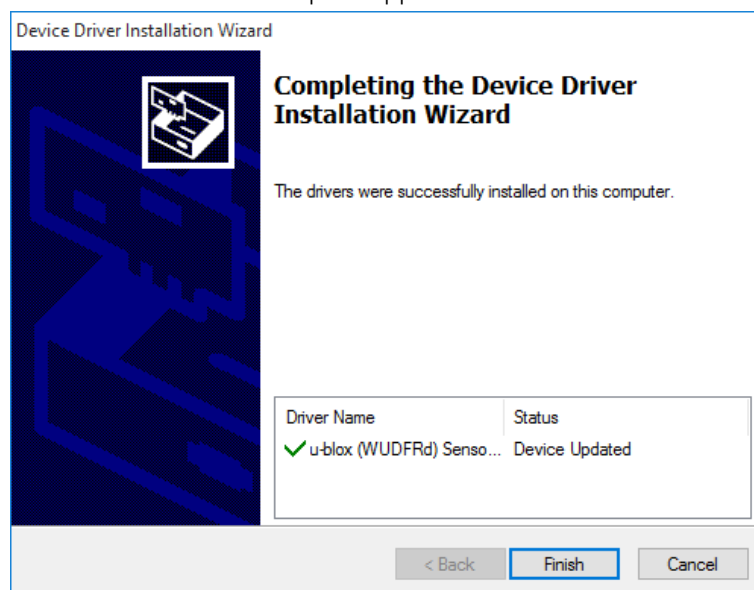
**Figure 5: Driver selection**

5. Click on 'Next' to start the installation of the Sensor Device Driver.



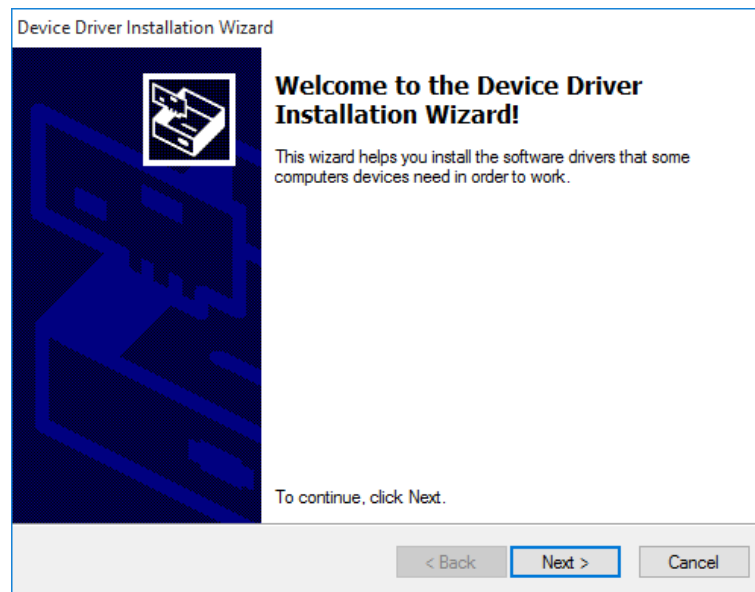
**Figure 6: Installation of Sensor Device Driver start**

After a successful installation, the following window will be shown. Click on 'Finish' to complete the USB Sensor driver installation. When only the USB Sensor driver has been selected at the previous step, the installation is almost finished and the next step is skipped.



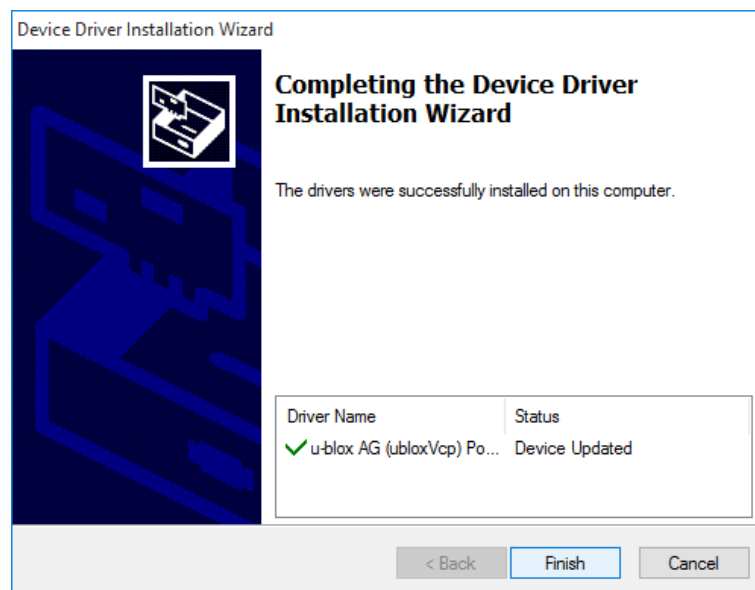
**Figure 7: Installation of Sensor Device Driver completed**

6. The Device Driver Installation Wizard will now install the Virtual COM Port driver installation. Click on 'Next' to continue the installation.



**Figure 8: Installation of Virtual COM Port start**

7. After a successful installation, the following window will be shown. Click on 'Finish' to complete the Virtual COM Port installation.



**Figure 9: Installation of Virtual COM Port completed**

8. The installation of the drivers is now almost finished and you can click on 'Finish' to quit the installer.

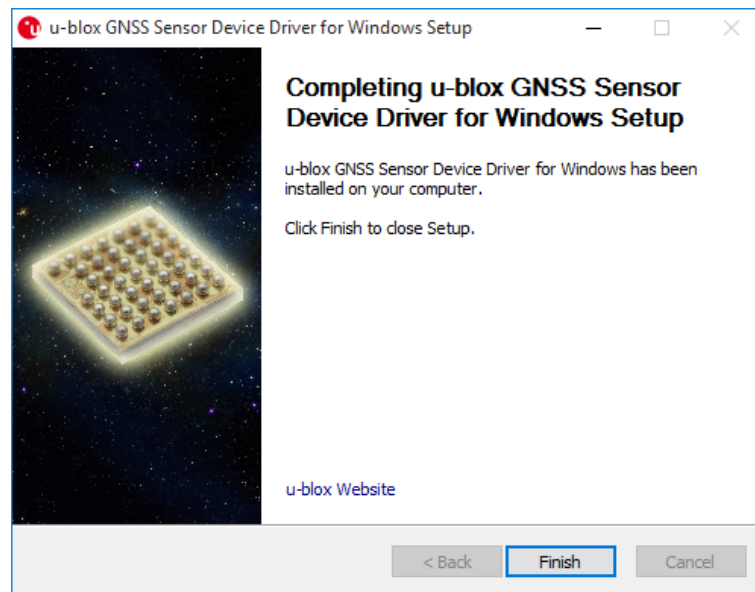


Figure 10: Installation completed

## 3.2 Connecting the u-blox GNSS receiver

Once the Sensor Device Driver has been installed (see [Chapter 3.1](#)), the device can be connected to any USB port.

1. When the device is connected for the first time to any port, the driver is installed. The following window can be possibly seen.

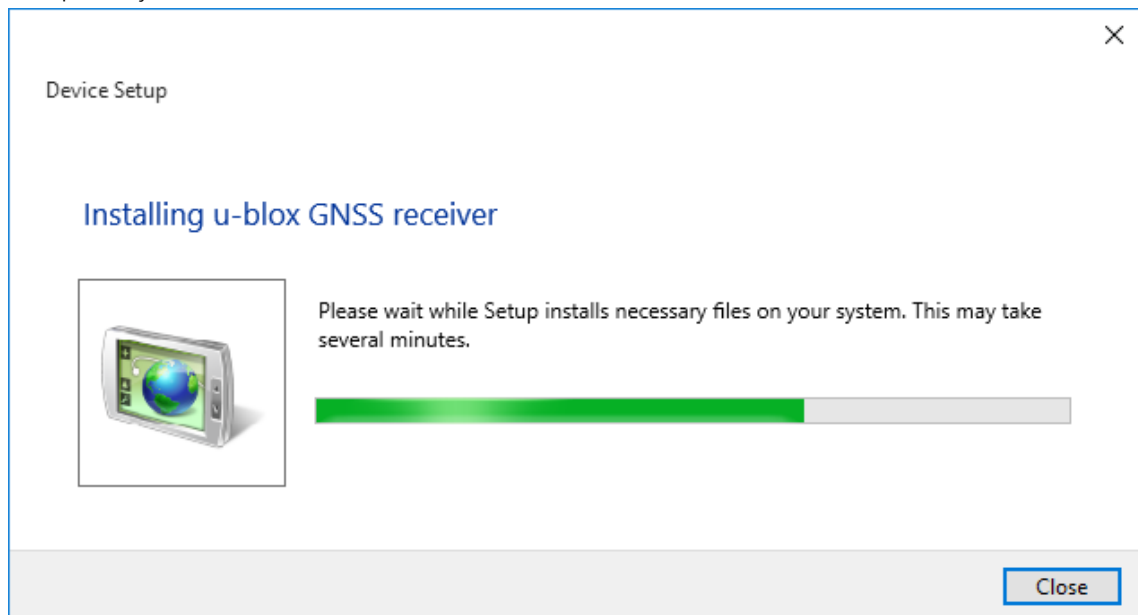
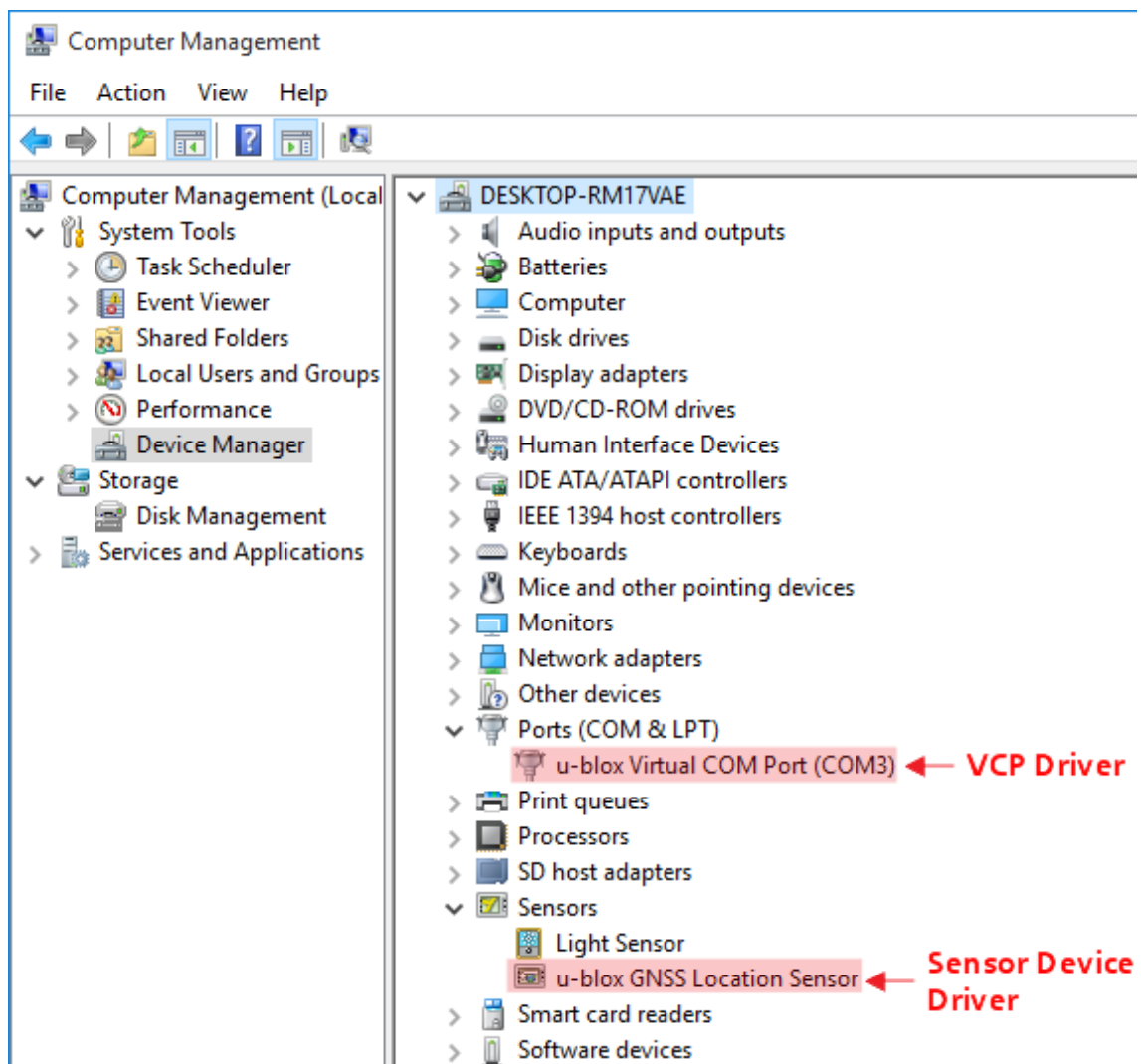


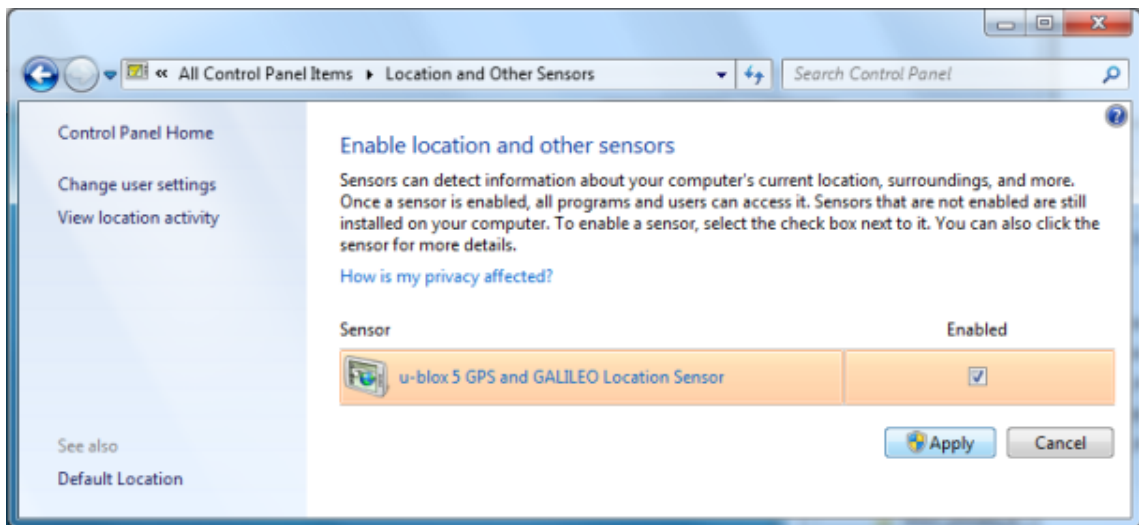
Figure 11: Device Setup

2. The installed drivers appear in the Device Manager as in the figure below.



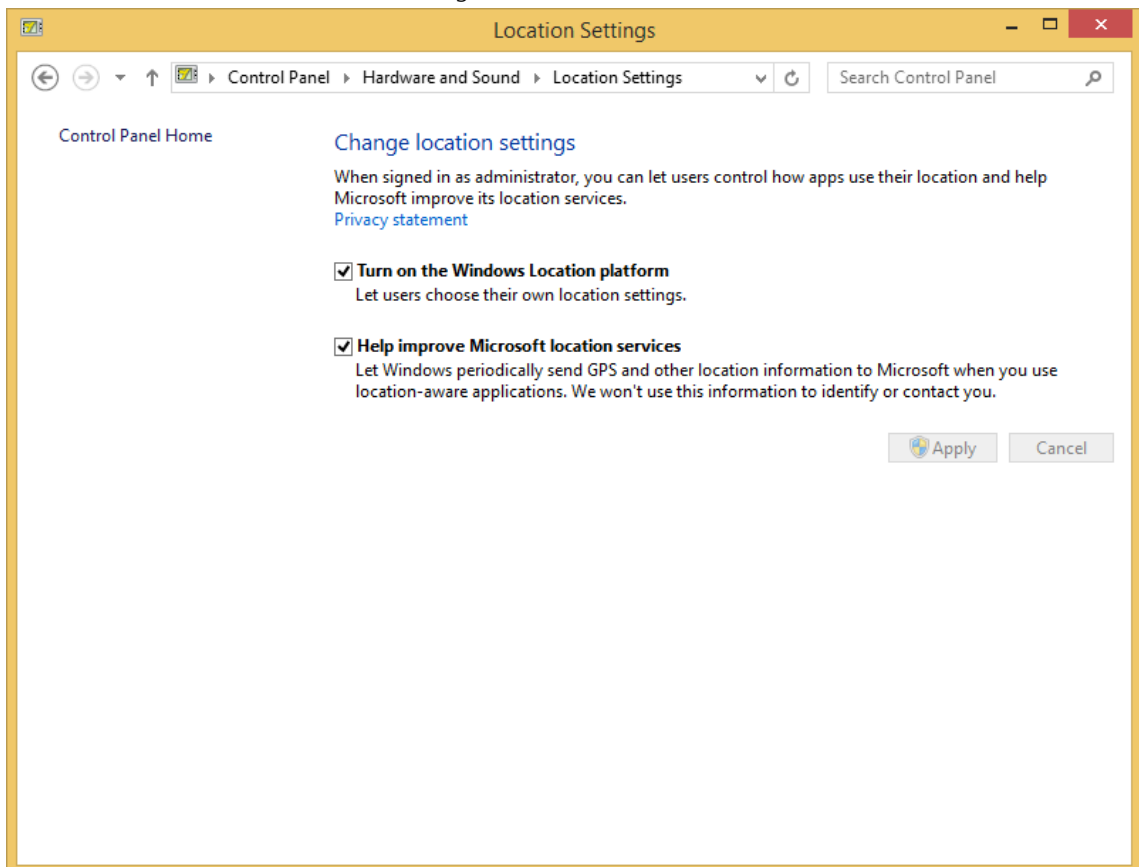
**Figure 12: Device Manager**

3. The access to the sensor data (like position) needs to be granted/enabled in the Control Panel of Windows, depending on the used Windows version.
  - In Windows 7 under 'Location and Other Sensors':



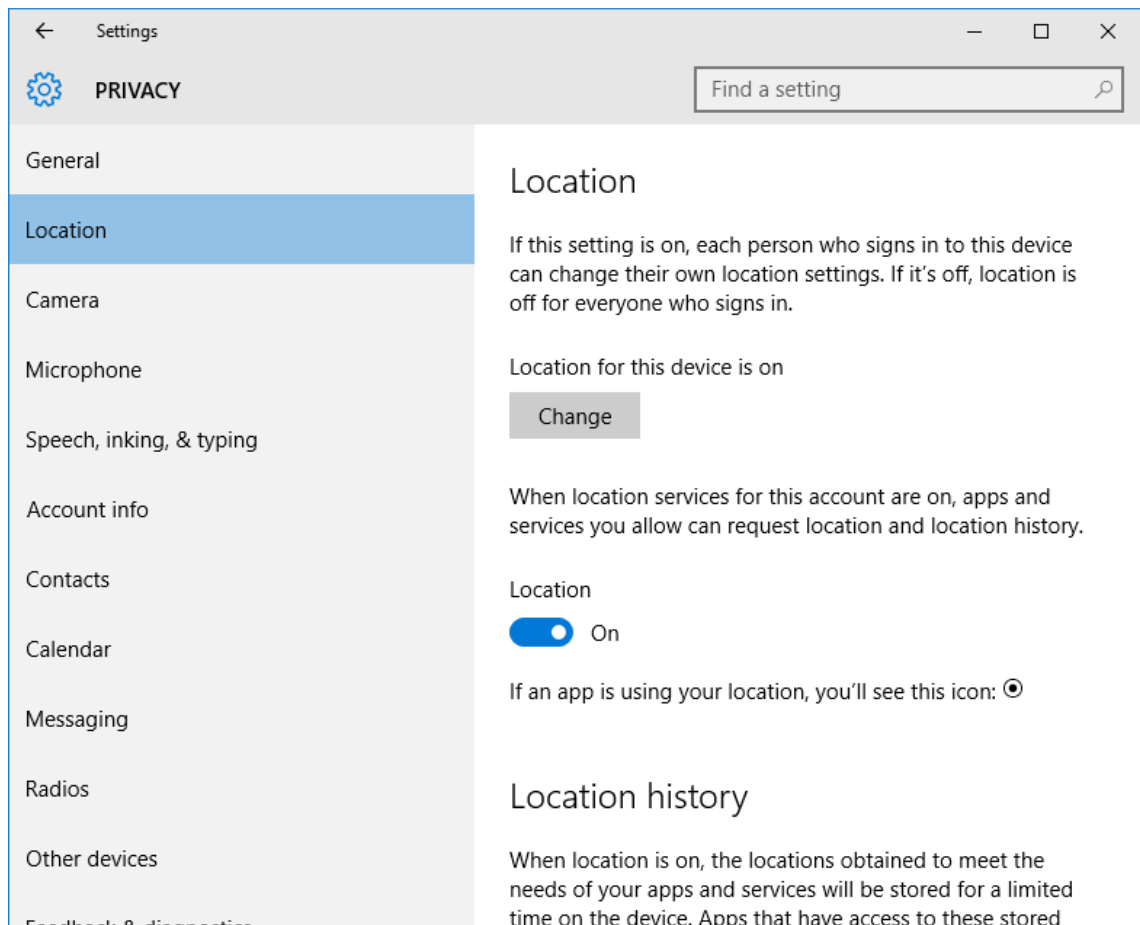
**Figure 13: Location Sensor Dialog Windows 7**

- In Windows 8/8.1 under 'Location Settings':



**Figure 14: Location Sensor Dialog Windows 8/8.1**

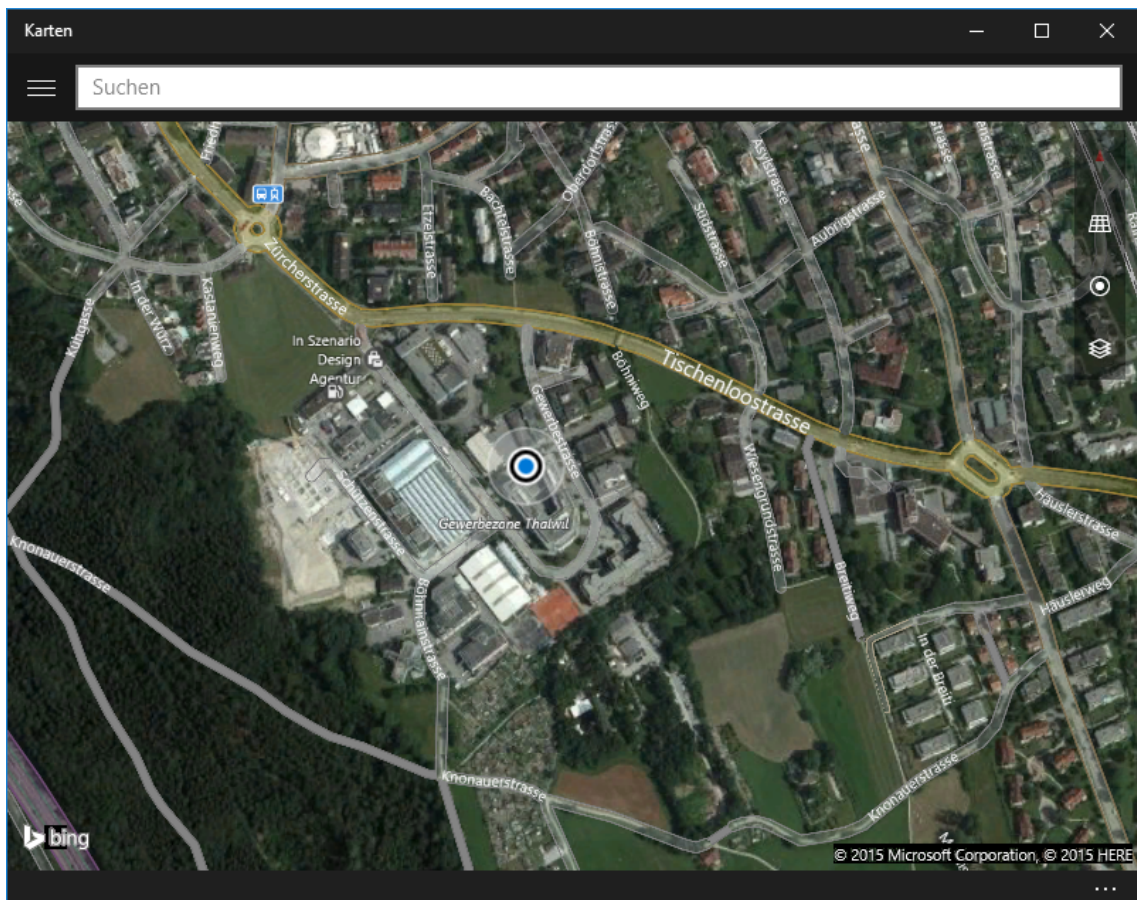
- In Windows 10 under 'Location':



**Figure 15: Location Sensor Dialog Windows 10**

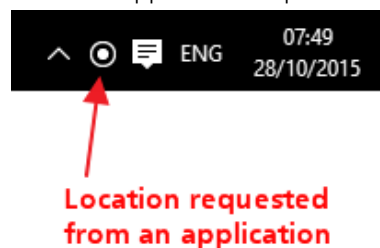
4. In order to see if the device works through the installed sensor, Microsoft Maps can be used.





**Figure 16: Maps with Location service**

The Windows 10 taskbar shows an icon if an application requests the location from the platform:



**Figure 17: Location Request Icon**

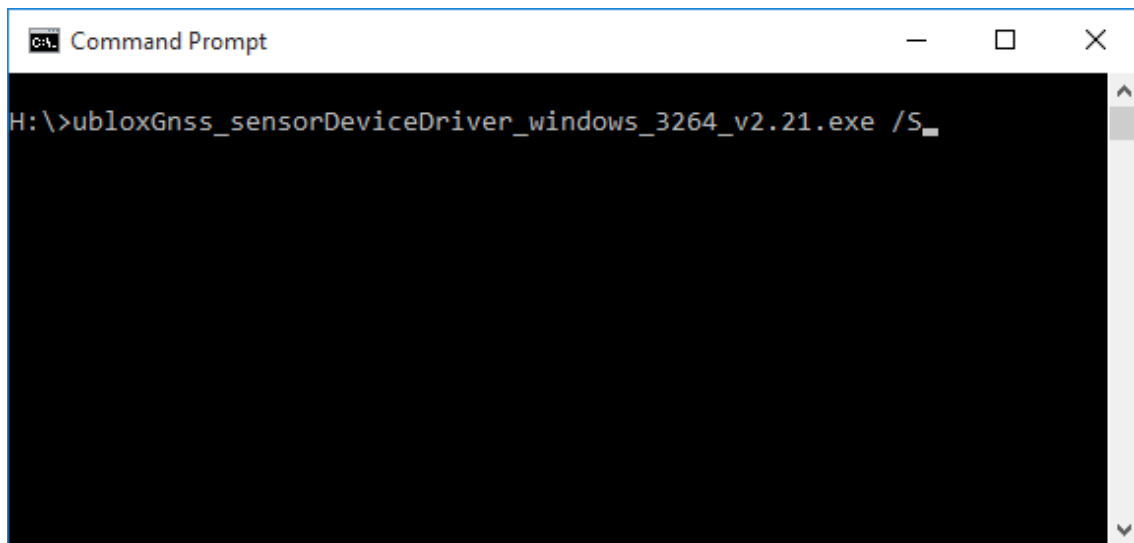
### 3.3 Silent Installation

The installer supports silent installation, allowing installation to be done in the background with no need for the user to click on anything during installation.

Silent installation can be done with the command  
`ubloxGnss_sensorDeviceDriver_windows_3264_v2.21.exe /S`

on the command prompt shown as below. Please note that the command is case-sensitive. After a short while, both sensor device and VCP drivers are installed. Then the device can be connected (see [Chapter 3.2](#)).

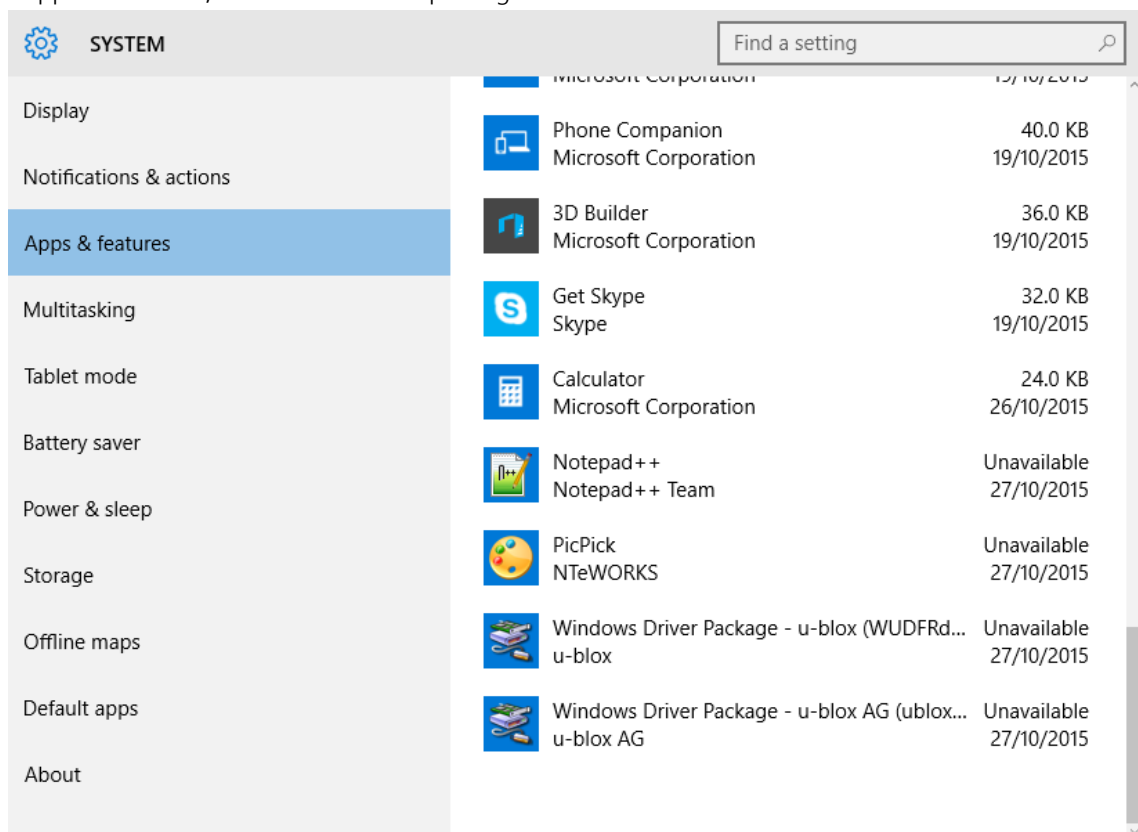




**Figure 18: Silent Installation**

### 3.4 Uninstalling the Driver

1. On Apps & Features, click on the driver package to uninstall as shown below.



**Figure 19: Uninstall Driver**

2. The driver is now removed.

# A Supported Sensor Data Properties

## A.1 Read Only Properties

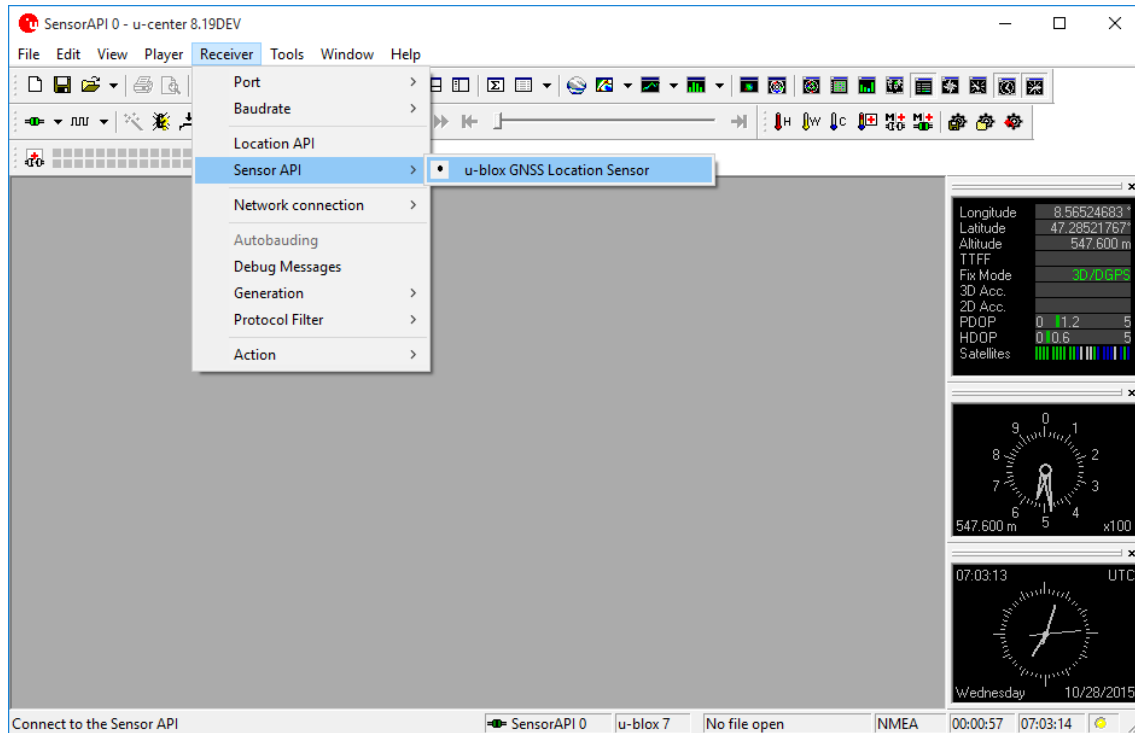
```
SENSOR_PROPERTY_CONNECTION_TYPE
SENSOR_PROPERTY_CURRENT_REPORT_INTERVAL
SENSOR_PROPERTY_DESCRIPTION
SENSOR_PROPERTY_FRIENDLY_NAME
SENSOR_PROPERTY_MANUFACTURER
SENSOR_PROPERTY_MIN_REPORT_INTERVAL
SENSOR_PROPERTY_MODEL
SENSOR_PROPERTY_PERSISTENT_UNIQUE_ID
SENSOR_PROPERTY_SERIAL_NUMBER
SENSOR_PROPERTY_STATE
SENSOR_PROPERTY_TYPE
SENSOR_DATA_TYPE_TIMESTAMP
SENSOR_DATA_TYPE_ALTITUDE_ELLIPSOID_METERS
SENSOR_DATA_TYPE_ALTITUDE_SEALEVEL_METERS
SENSOR_DATA_TYPE_ERROR_RADIUS_METERS
SENSOR_DATA_TYPE_FIX_QUALITY
SENSOR_DATA_TYPE_FIX_TYPE
SENSOR_DATA_TYPE_HORIZONTAL_DILUTION_OF_PRECISION
SENSOR_DATA_TYPE_LATITUDE_DEGREES
SENSOR_DATA_TYPE_LONGITUDE_DEGREES
SENSOR_DATA_TYPE_POSITION_DILUTION_OF_PRECISION
SENSOR_DATA_TYPE_SATELLITES_IN_VIEW
SENSOR_DATA_TYPE_SATELLITES_IN_VIEW_AZIMUTH
SENSOR_DATA_TYPE_SATELLITES_IN_VIEW_ELEVATION
SENSOR_DATA_TYPE_SATELLITES_IN_VIEW_PRNS
SENSOR_DATA_TYPE_SATELLITES_IN_VIEW_STN_RATIO
SENSOR_DATA_TYPE_SATELLITES_USED_COUNT
SENSOR_DATA_TYPE_SATELLITES_USED_PRNS
SENSOR_DATA_TYPE_SPEED_KNOTS
SENSOR_DATA_TYPE_TRUE_HEADING_DEGREES
SENSOR_DATA_TYPE_VERTICAL_DILUTION_OF_PRECISION
SENSOR_DATA_TYPE_ALTITUDE_ELLIPSOID_ERROR_METERS
SENSOR_DATA_TYPE_ALTITUDE_SEALEVEL_ERROR_METERS
SENSOR_DATA_TYPE_GEOIDAL_SEPARATION
SENSOR_DATA_TYPE_GPS_OPERATION_MODE
SENSOR_DATA_TYPE_GPS_SELECTION_MODE
SENSOR_DATA_TYPE_GPS_STATUS
```

## A.2 Read/Write Properties

```
SENSOR_PROPERTY_CURRENT_REPORT_INTERVAL
SENSOR_PROPERTY_LOCATION_DESIRED_ACCURACY
```

## B u-center for Windows

Selection of the Sensor API functionality is shown in the figure below. When u-blox sensor is enabled, the Sensor API should blink green every time sensor location data events are generated.



**Figure 20: u-center using Sensor API**

## C Related Documents

Reference	Document name
1	<a href="#">Introduction to the Sensor and Location Platform in Windows</a>
2	u-blox M8 Receiver Description and Protocol Specification, Doc. No UBX-13003221



For regular updates to u-blox documentation and to receive product change notifications please register on our homepage.

## D Revision History

Revision	Date	Name	Staus / Comment
01	03-Sept-2009	svin	Initial release
02	12-Oct-2009	khir	VCP manual addition removed. Silent installation added.
03	04-Apr-2012	khir	Windows 8 compatibility added. Download link updated.
04	28-October-2015	maba	Complete update of pictures. Adding Windows 10 support, limitation for Windows N versions and supported u-blox GNSS receivers.

Revision B was renamed to 02, Revision C to 03.

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