u-blox GNSS Sensor and VCP Device Driver

User guide

Abstract

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

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Document Information

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Contents

1 Introduction

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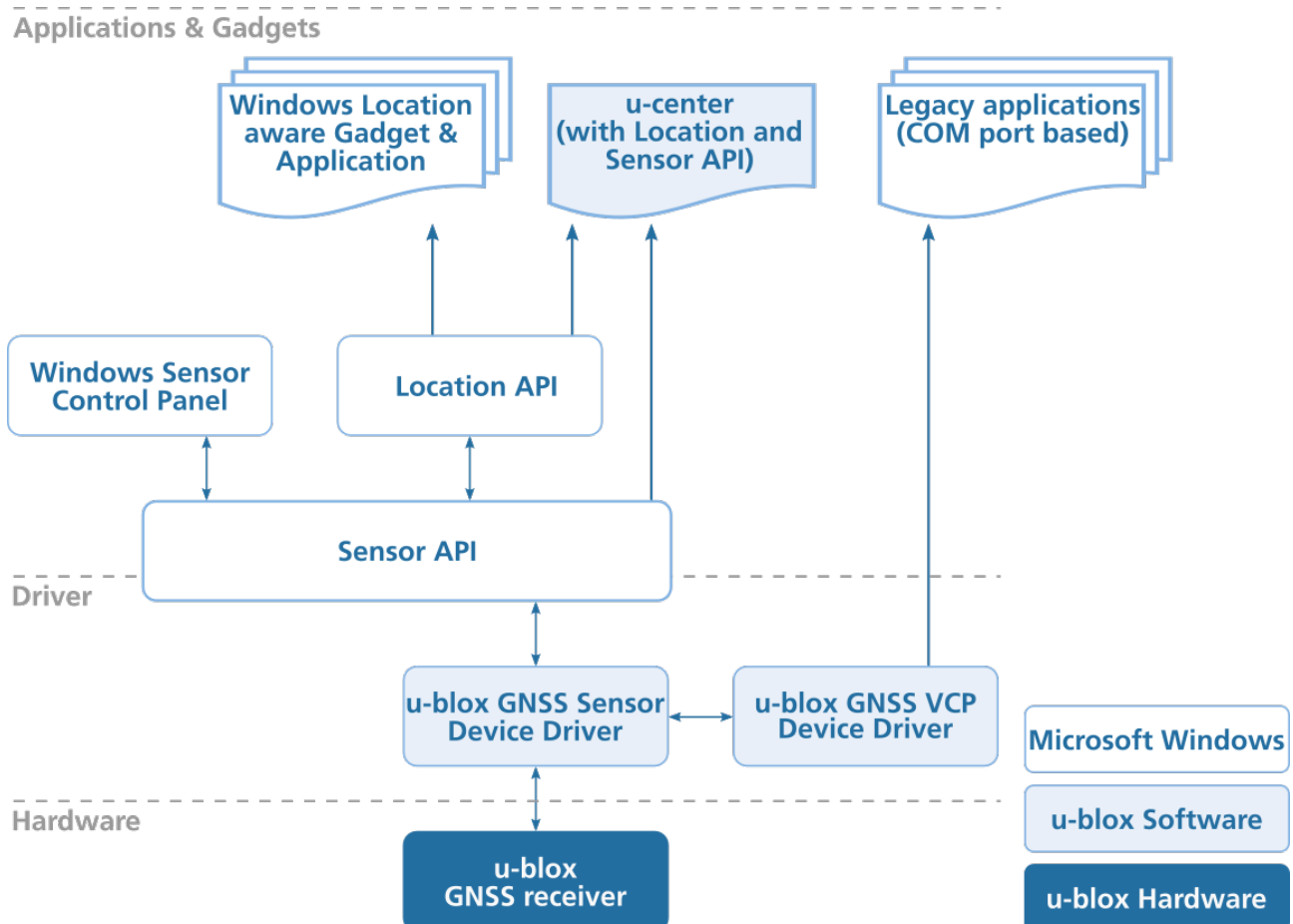
The u-blox Sensor Device Driver connects all u-blox GNSS receivers to the sensor and location API structure for Windows 7 onwards. It parses and converts u-blox GNSS messages into the standard sensor properties which can be accessed by the location and sensor APIs (see Figure 1).

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 architectural layers of the various components of the Sensor and Location platform, and the relationship between the u-blox components (hardware 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, like 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 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 Location Settings

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].

In Windows 8 and 8.1, the control panel for system-wide enabling/disabling of sensors is now called "Location Settings". Also, individual control of application access to location can be found in PC Settings->Privacy->Location.

In Windows 10, the "Location Settings" control panel has been removed, and all access control to location has been placed in Settings->Privacy->Location.

2 u-blox Components and Software

2.1 Supported u-blox GNSS Receivers

The u-blox GNSS Sensor Device Driver v supports the following u-blox GNSS receivers:

- 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 Sensor Device Driver is signed for the following version of Microsoft Windows:

- Windows 7 32 and 64-bit
- Windows 8.1 32 and 64-bit
- Windows 10 Anniversary update (version 1607, build 14393) 32 and 64-bit

The VCP Device Driver is signed for the following version of Microsoft Windows:

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

⚠️ **Attention** 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 u-blox GNSS Sensor Device Driver

The u-blox USB Sensor Device Driver connects any 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 and integrates with the radio manager present in Windows 8 and beyond. The driver also signed by Microsoft's Windows Hardware certification program for all OS's supporting the sensor platform.

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

2.4 u-blox Virtual COM Port (VCP) Device Driver

In addition to the Sensor Device Driver, u-blox provides a Virtual COM Port (VCP) driver to help customers connecting or 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 applications to the modern Windows Location and Sensor Platform.

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

2.5 u-center for Windows

The u-center GNSS evaluation software for automotive, mobile terminal and infrastructure applications provides a powerful tool for evaluation, performance analysis and configuration of u-blox GNSS receivers. Its unique flexibility

makes the u-center GNSS evaluation software an invaluable tool for evaluation, analysis and configuration of u-blox GNSS receivers. u-blox GNSS receivers can be configured using the u-center evaluation software.

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.

2.6 Required Messages

Please note that the Sensor Device Driver will activate the following messages in the receiver. This is to ensure the receiver outputs the messages that are needed to extract the information required by the sensor platform.

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 Sensor Device Driver Installation with the Installer)
2. Connect the device (see Connecting the u-blox GNSS receiver)
3. Enable the sensor (see Connecting the u-blox GNSS receiver)

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

1. Install the u-blox GNSS VCP Device Driver (see VCP Device Driver Installation with the Installer)

The following sections explain the installation procedure.

3.1 Sensor Device Driver Installation with the Installer

This section explains the installation of the Sensor Device Driver with the provided installer.

☞ If not otherwise noted, the screen shots are taken from a Windows 10 installation.

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.
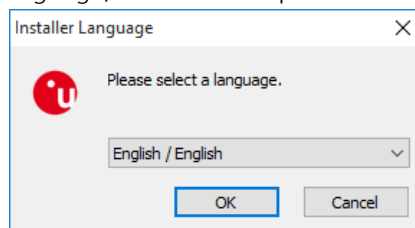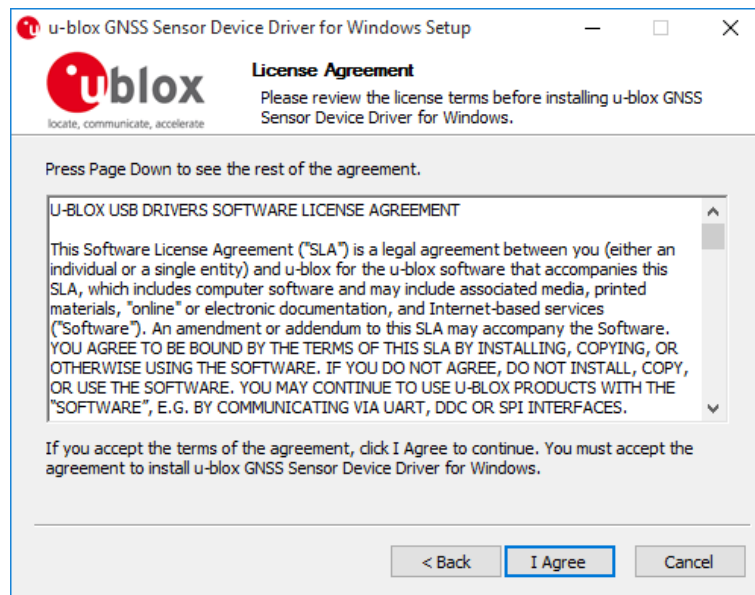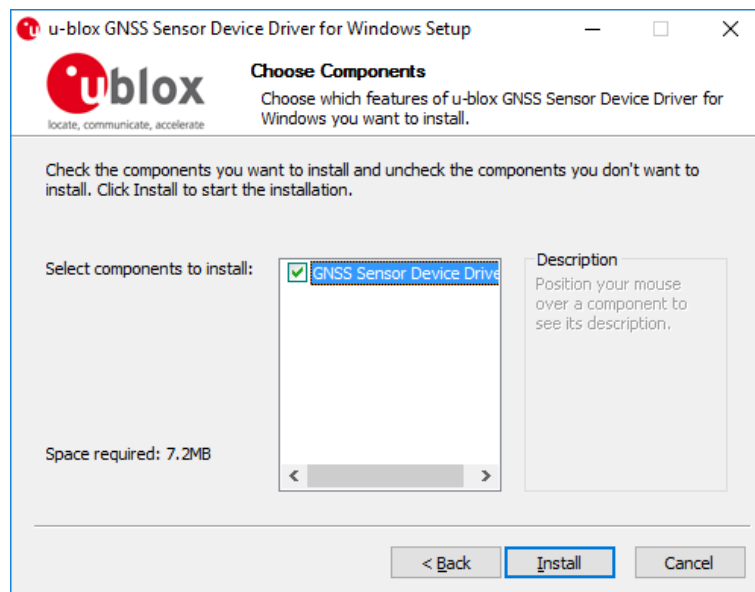

Figure 2: Language selection
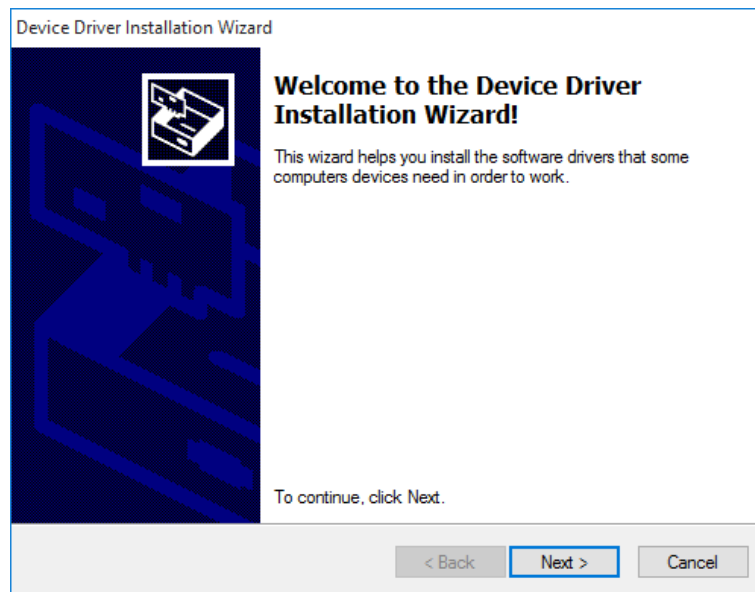

Figure 3: Welcome message

Figure 4: License agreement

4. On the "Choose Components" window, as shown below, make sure the GNSS Sensor Device Driver is selected as shown in Figure 5. Then click on the "Install" button.
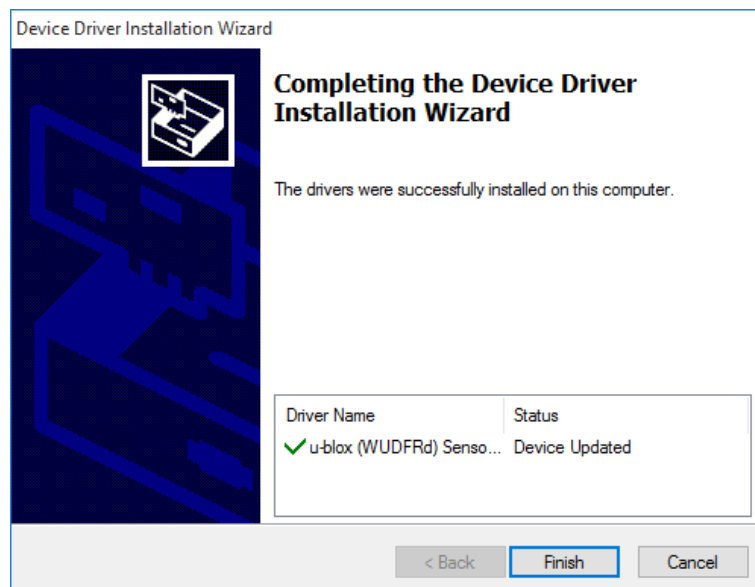

Figure 5: Driver selection

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 Device Driver installation.

Figure 7: Installation of Sensor Device Driver completed

6. The installation of the Sensor Device Driver is now finished and you can click on "Finish" to quit the installer.
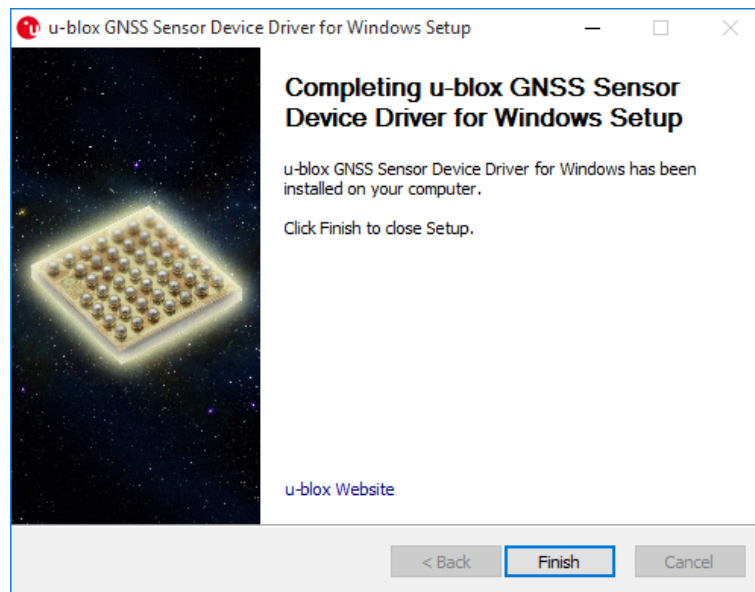
Figure 8: Installation completed

3.2 VCP Device Driver Installation with the Installer

☞ The Sensor Device Driver has to be installed in order to get the VCP Device Driver to work.

This section explains the installation of the VCP Device Driver with the provided installer.

1. Download the latest version of the installer.
2. Double-click on the downloaded file to start the installation.
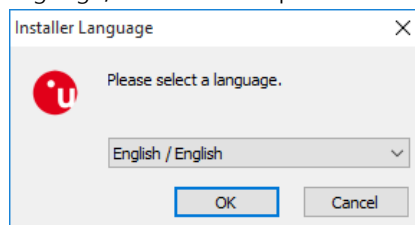3. On the pop-up window, select the language, and then accept the License Agreement.

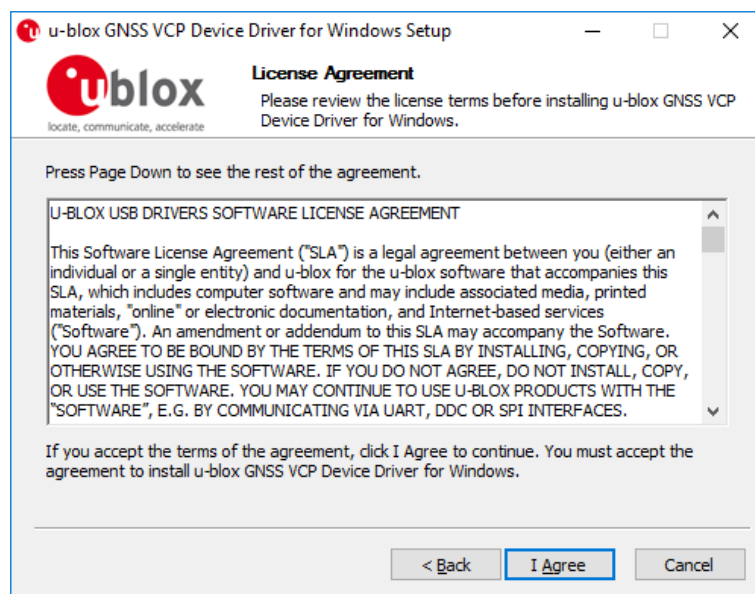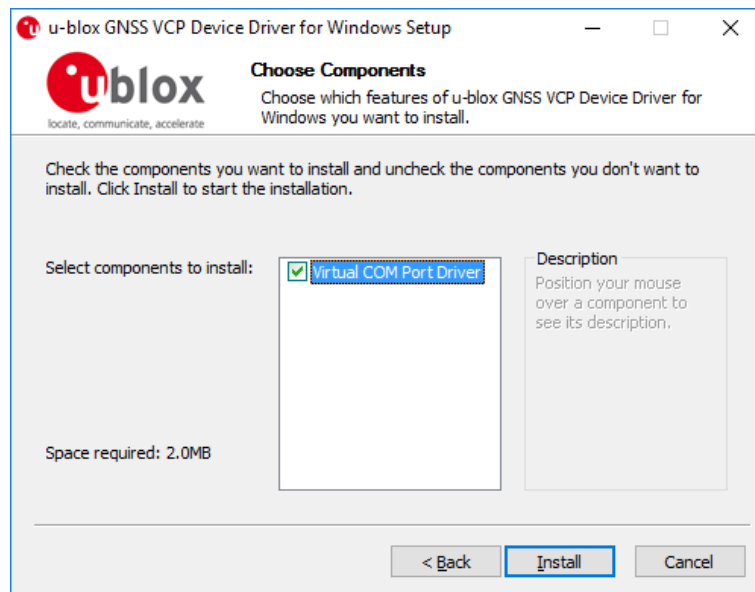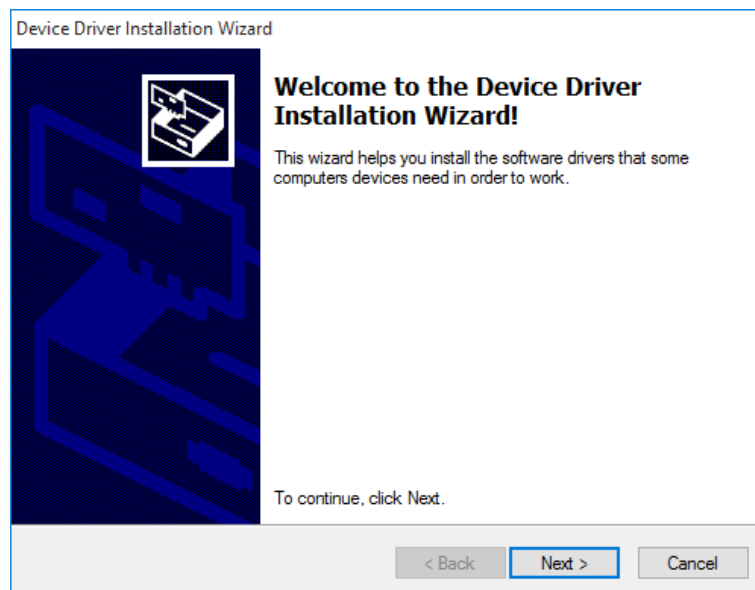**Figure 9: Language selection**

Figure 10: Welcome message

Figure 11: License agreement

4. On the "Choose Components" window, as shown below, make sure the VCP Device Driver is selected as shown in Figure 5. Then click on the "Install" button.

Figure 12: Driver selection

5. Click on "Next" to start the installation of the VCP Device Driver.

Figure 13: Installation of VCP Device Driver start

After a successful installation, the following window will be shown. Click on "Finish" to complete the Virtual COM Port installation.
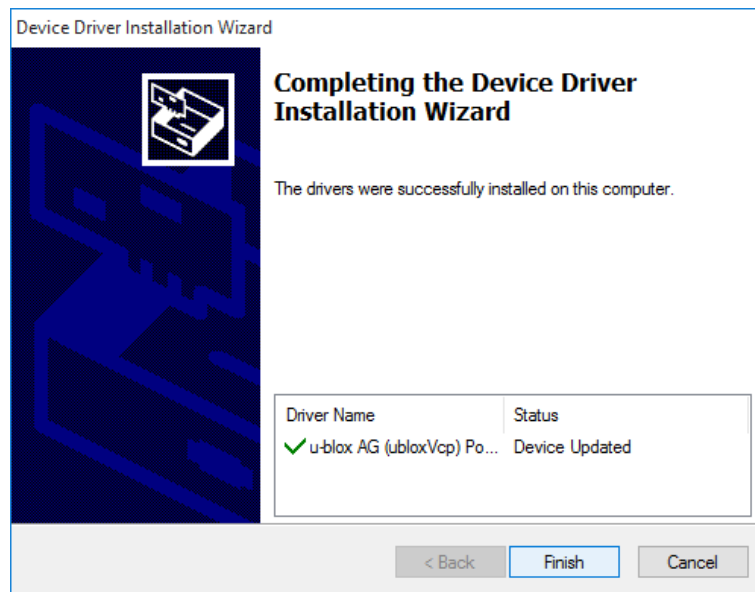
Figure 14: Installation of Virtual COM Port completed

6. The installation of the VCP Device Driver is now finished and you can click on "Finish" to quit the installer.

Figure 15: Installation completed

3.3 Connecting the u-blox GNSS receiver

Once the Sensor Device Driver has been installed (see Sensor Device Driver Installation with the Installer), a u-blox GNSS receiver 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 will appear.
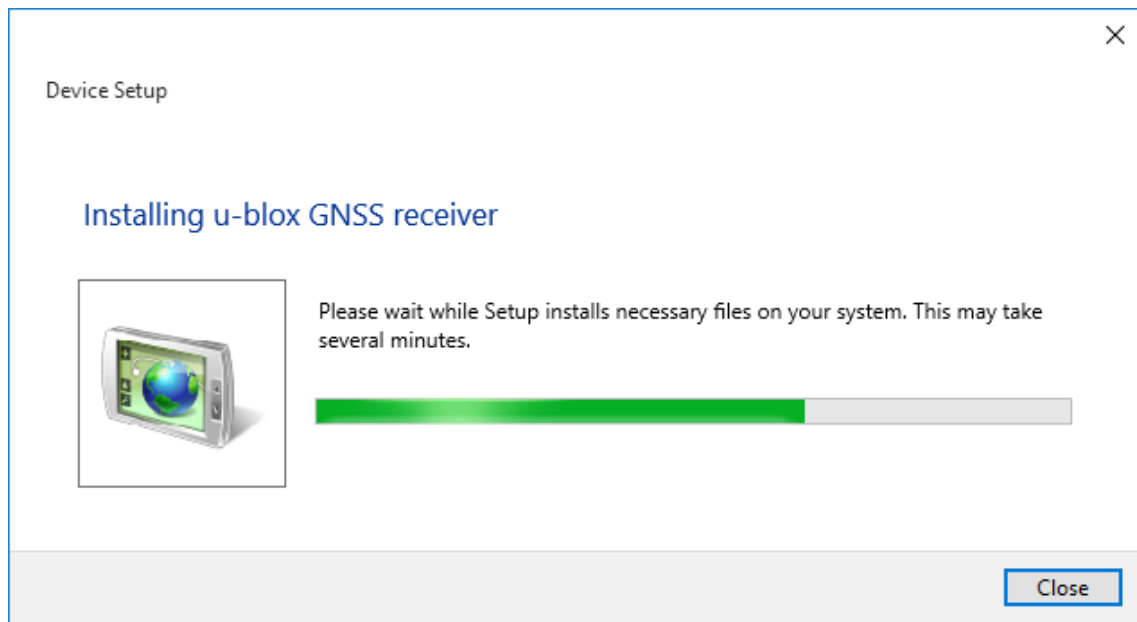
Figure 16: Device Setup

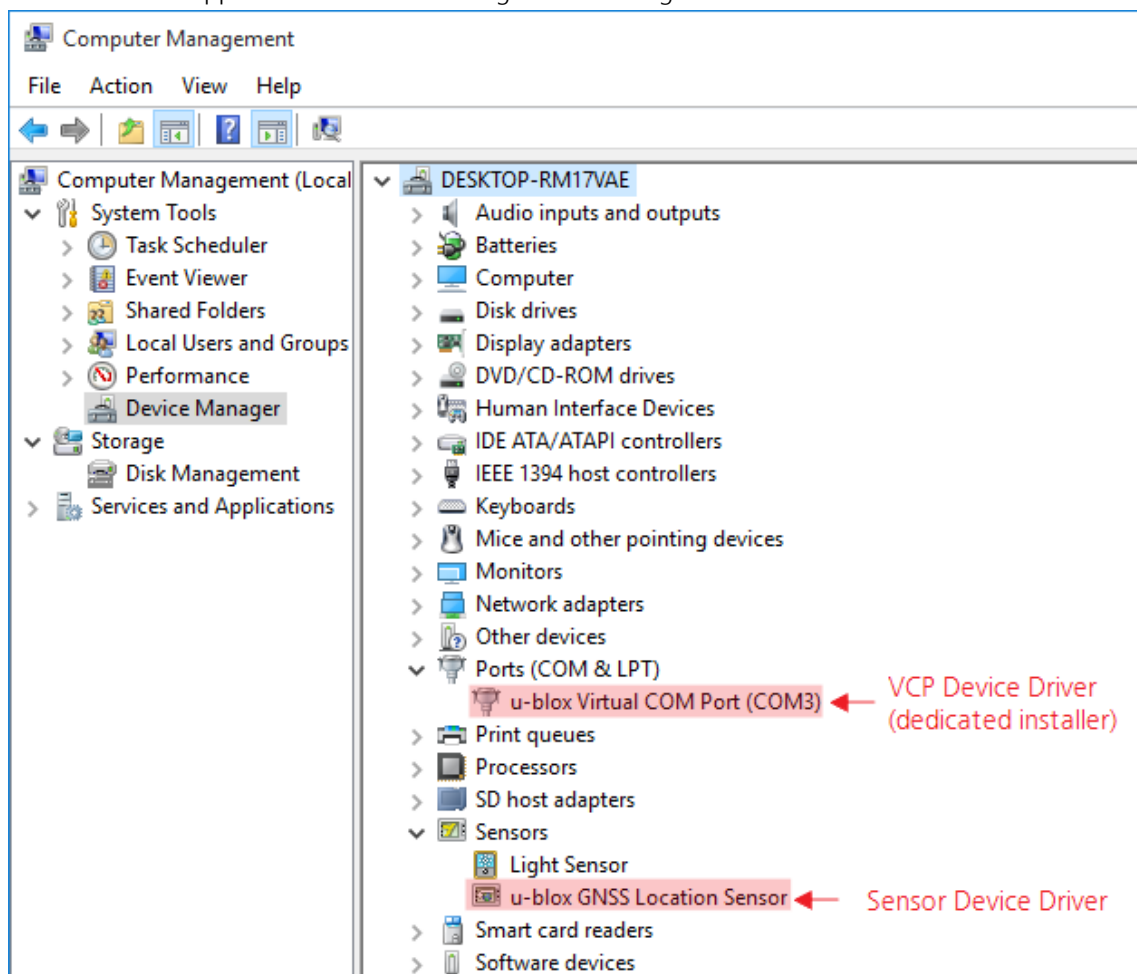**2.** The installed drivers appear in the Device Manager as in the figure below.

Figure 17: 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.

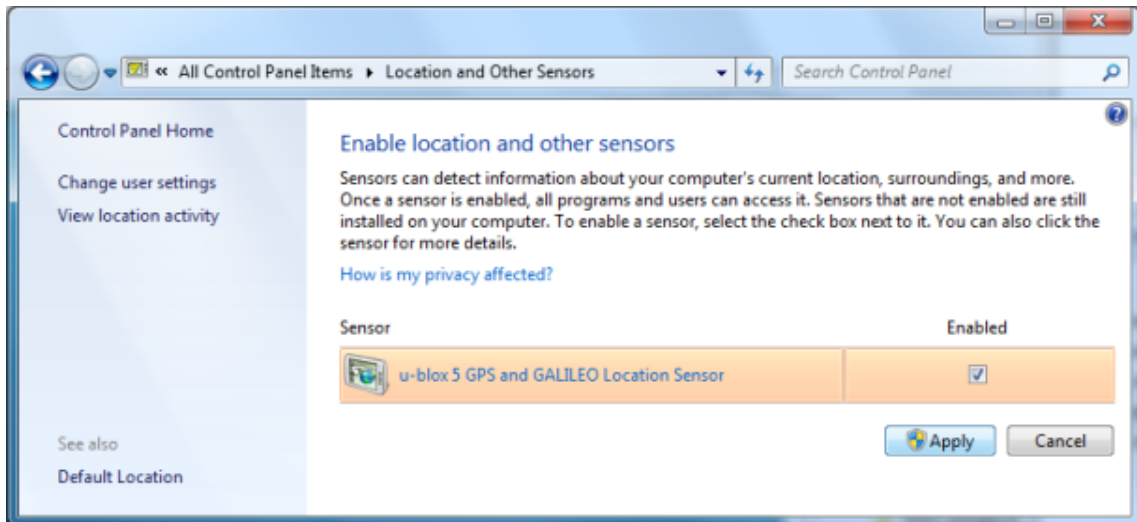- In Windows 7 under "Location and Other Sensors":

Figure 18: Location Sensor Dialog Windows 7

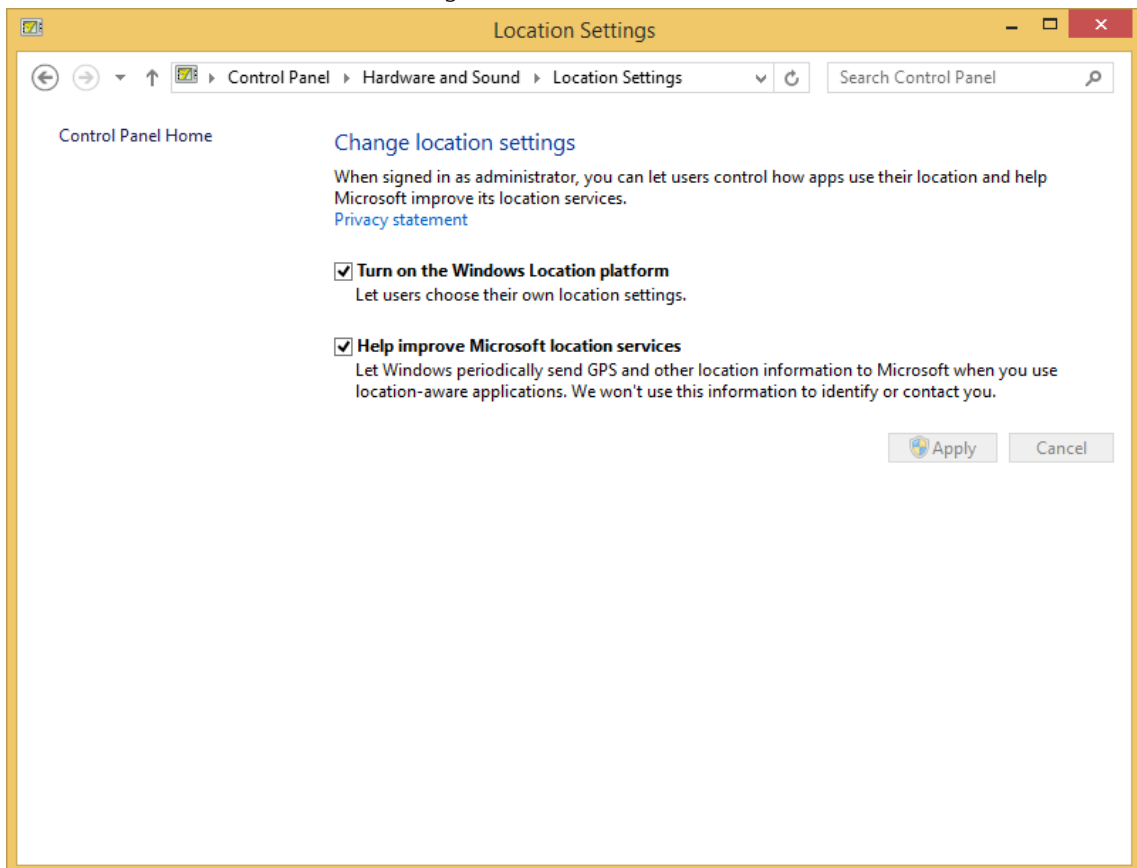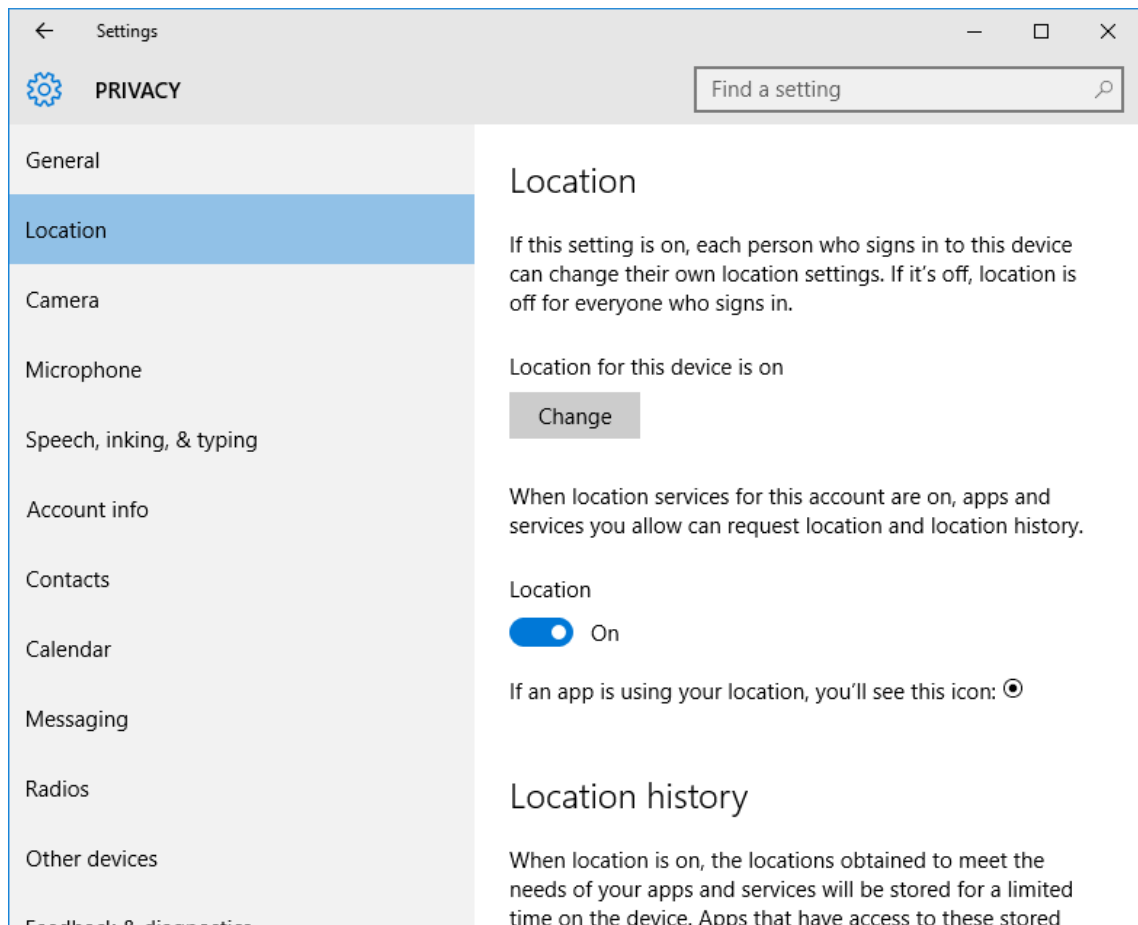- In Windows 8/8.1 under "Location Settings":

Figure 19: Location Sensor Dialog Windows 8/8.1

- In Windows 10 under "Settings->Privacy->Location":

Figure 20: Location Sensor Dialog Windows 10

4. In order to see if the device works through the installed sensor, Microsoft Maps can be used.
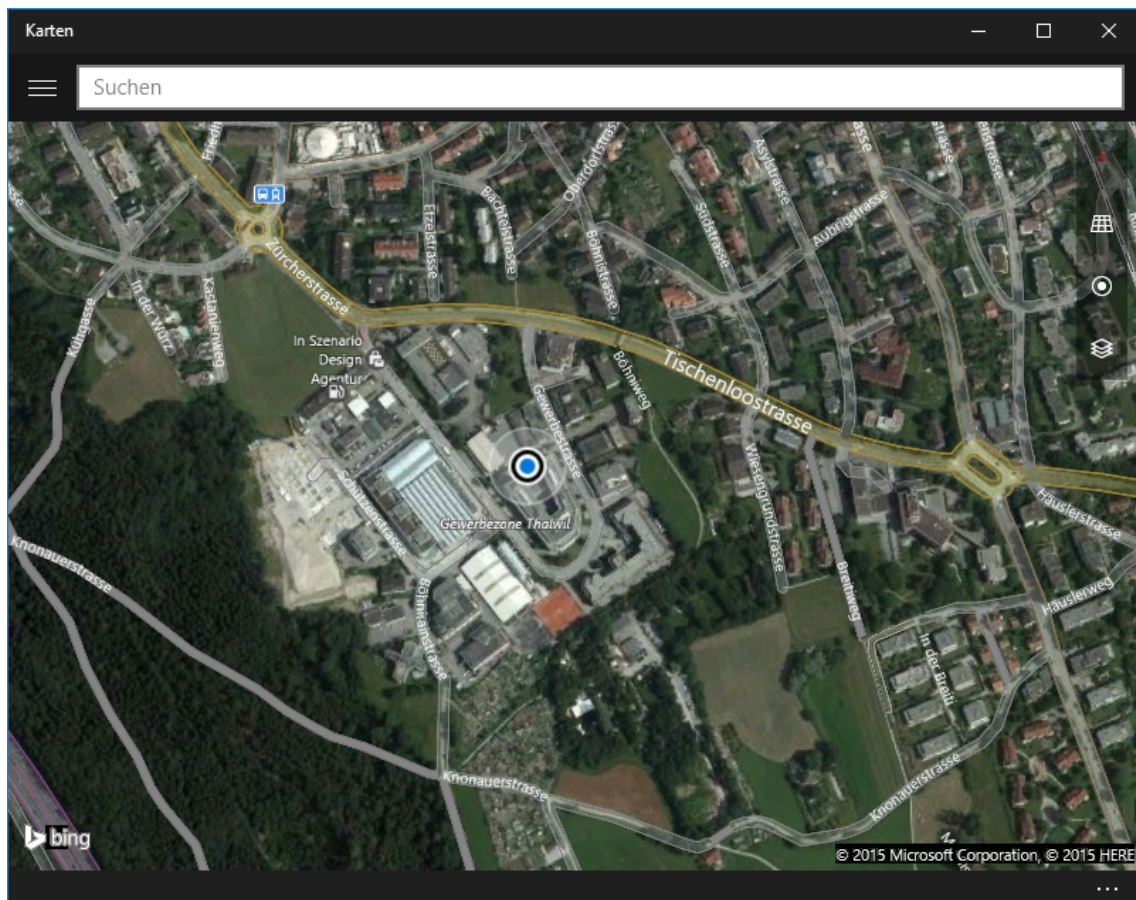
Figure 21: Maps with Location service

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

Figure 22: Location Request Icon

3.4 Silent Installation

The installers support silent installation, allowing an installation to occur in the background with no need for the user interaction during installation.

To do a silent installation, run the following from the command line

`ubloxGnss_sensorDeviceDriver_windows_3264_v2.31.exe /S`

or

`ubloxGnss_vcpDeviceDriver_windows_3264_v2.30.exe /S`

Please note that the command parameter '/S' is case-sensitive.

Drivers are installed after a short while, after which (assuming the Sensor Device Driver installer was run), a u-blox GNSS device can be connected (see Connecting the u-blox GNSS receiver).
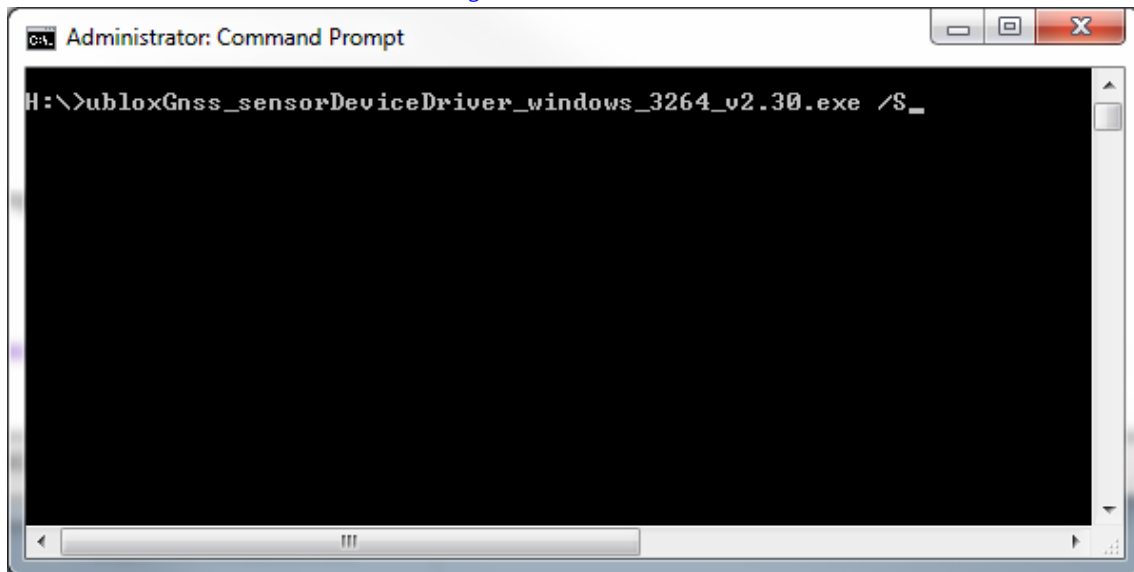

Figure 23: Silent Installation

3.5 Uninstalling the Driver

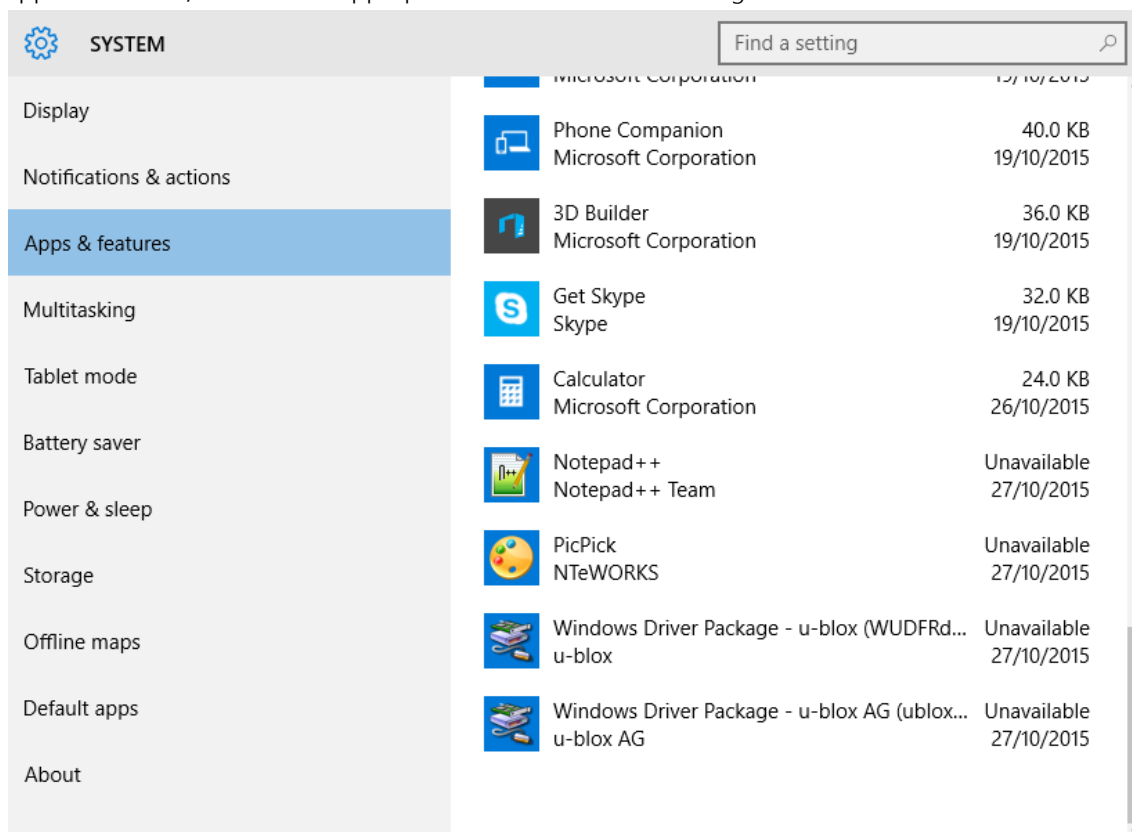**1.** On Apps & Features, click on the appropriate Windows Driver Package to uninstall as shown below.

Figure 24: Uninstall Driver

2. The driver is now removed.

4 Supported Sensor Data Properties

4.1 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_HORIZONAL_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
```

4.2 Read/Write Properties

```
SENSOR_PROPERTY_CURRENT_REPORT_INTERVAL
SENSOR_PROPERTY_LOCATION_DESIRED_ACCURACY
```

5 u-center for Windows

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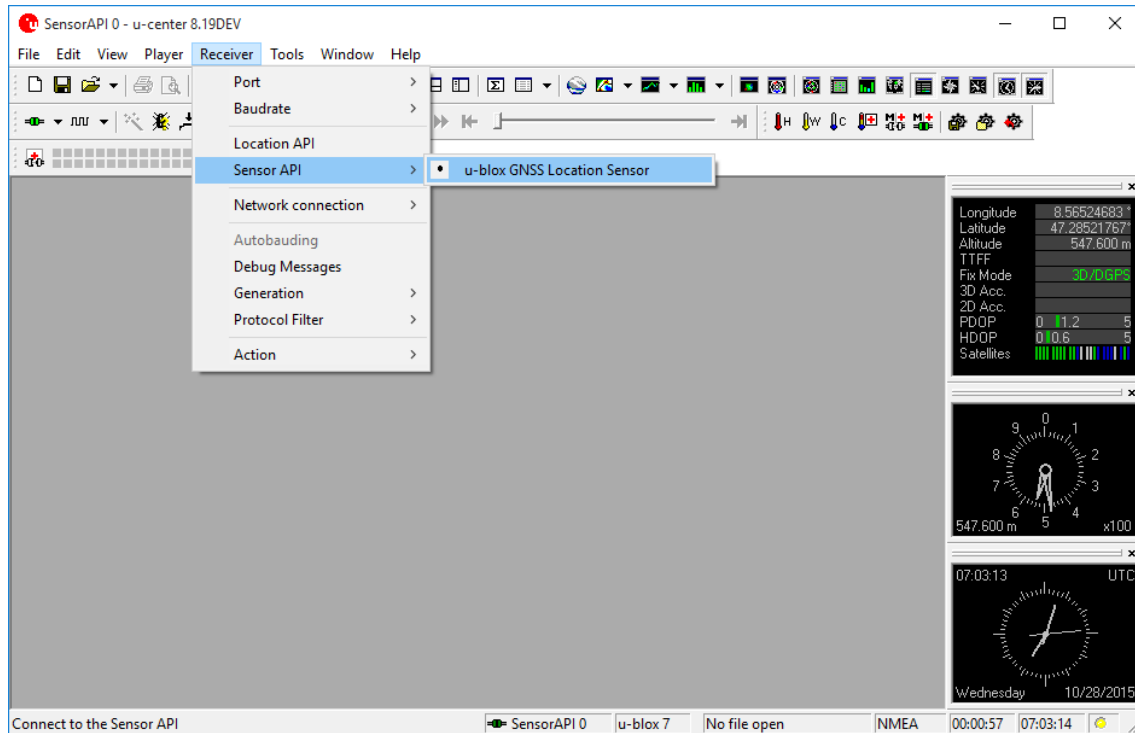

Figure 25: u-center using Sensor API

6 Related Documents

Reference	Document name
1	Introduction to the Sensor and Location Platform in Windows
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 website.

7 Revision History

Revision	Date	Name	Status / Comment
-	03-Sept-2009	svin	Initial release
B	12-Oct-2009	khir	VCP manual addition removed. Silent installation added.
C	04-Apr-2012	khir	Windows 8 compatibility added. Download link updated. Last revision with document number GPS-SW-09012.
R04	28-Oct-2015	mfre	Complete update of pictures. Adding Windows 10 support, limitation for Windows N versions and supported u-blox GNSS receivers.
R05	25-Oct-2016	jbow	Sensor and VCP now have separate installers, plus general minor changes to bring the document up to date.
R06	22-Nov-2016	jbow	Removed references to driver versions in the user guide title.

Contact

For complete contact information visit us at www.u-blox.com.

u-blox Offices

North, Central and South America

u-blox America, Inc.
Phone: +1 703 483 3180
E-mail: info_us@u-blox.com

Regional Office West Coast
Phone: +1 408 573 3640
E-mail: info_us@u-blox.com

Technical Support
Phone: +1 703 483 3185
E-mail: support_us@u-blox.com

Headquarters
Europe, Middle East, Africa

u-blox AG
Phone: +41 44 722 74 44
E-mail: info@u-blox.com
Support: support@u-blox.com

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.
Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office Australia
Phone: +61 2 8448 2016
E-mail: info_anz@u-blox.com
Support: support_ap@u-blox.com

Regional Office China (Beijing)
Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Chongqing)
Phone: +86 23 6815 1588
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shanghai)
Phone: +86 21 6090 4832
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shenzhen)
Phone: +86 755 8627 1083
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office India
Phone: +91 80 4050 9200
E-mail: info_in@u-blox.com
Support: support_in@u-blox.com

Regional Office Japan (Osaka)
Phone: +81 6 6941 3660
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Japan (Tokyo)
Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea
Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan
Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com