GPS

# USB GPS sensor driver
# for Windows 7 location and sensor platform

## User Guide

**Abstract**

This document describes the use and installation of u-blox USB Location Sensor driver for the Windows 7 operating system to be used with u-blox GPS receivers.

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# 1 Introduction

The Windows 7 operating system provides built-in support for sensor devices including location sensors, such as GPS devices. As part of this support, the Windows Sensor and Location platform provides a standard way for u-blox to expose GPS Location sensor 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 USB sensor driver connects all u-blox GPS receivers to the sensor and location API structure for Windows 7. It parses and converts u-blox GPS 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, a GPS sensor is part of the Location category.

## 1.2 u-blox sensor and location platform

The following diagram shows the relationship between user and u-blox components:

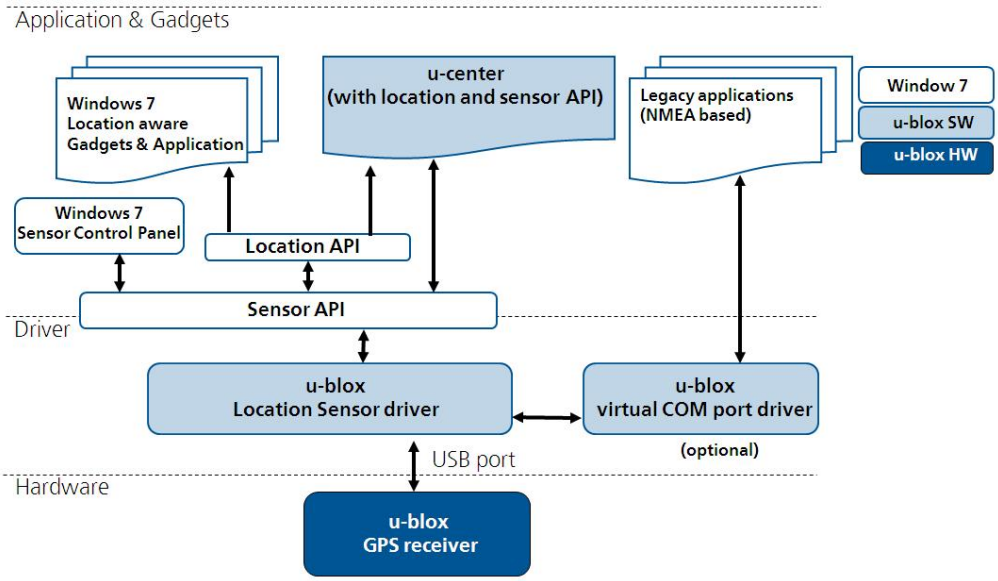



**Figure 1: Overview of u-blox drivers and applications with Windows**

## 1.3 Sensor API

The Sensor API enables C++ 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.

## 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 the C++ programming language, or in scripting languages, such as JScript. 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[3]*.

## 1.5 Sensors 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[3]*.

# 2 u-blox environment

### 2.1.1 Location sensor

In Windows 7, u-blox GPS receivers are classified within the sensor part of the Location category.

### 2.1.2 Sensor driver

u-blox has created a USB sensor driver connecting all u-blox GPS receivers to the Windows 7 sensor and location platform. The u-blox Location Sensor 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 is WHQL certified.

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

Beside this sensor driver u-blox provides a virtual com port driver to help customers connecting/testing u-blox GPS receivers with legacy Windows NMEA-based applications. This solution is intended to help u-blox' customers to smoothly migrate their legacy location application to the Windows 7 location and sensor platform. u-blox recommends the latter approach in accordance with Microsoft sensor and location API utilization policy.

### 2.1.3 u-center

The u-center GPS Evaluation Software provides a powerful platform for u-blox GPS product evaluation, configuration, testing and real-time performance visualization of u-blox GPS receiver products. It also provides AssistNow client functionality for A-GPS.
From version 5.08, u-center allows collection and monitoring of location and u-blox sensors 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 property 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 u-blox proprietary functionalities.

The Sensor API initiates events whenever sensor data and property events are generated (like Location API functions). The bidirectional sensor API also features access to u-blox proprietary messages through the Sensor API proprietary property fields (see section "Basic functionality" in Appendix B).

u-center software with location API capabilities is available free of charge. Please download this version from the u-blox website.

# 3 u-blox driver installation

To be able to use the Sensor, you have to

i. Install the Sensor driver (See 3.1)
ii. Connect the device (See 3.3)
iii. Enable the sensor (See 3.3)

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

i. Install the VCP driver (See 3.1)
ii. Add the VCP on Device Manager (See 3.2)

The following sections explain the installation procedure.

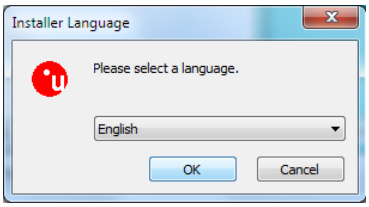
## 3.1 Driver installation with the installer

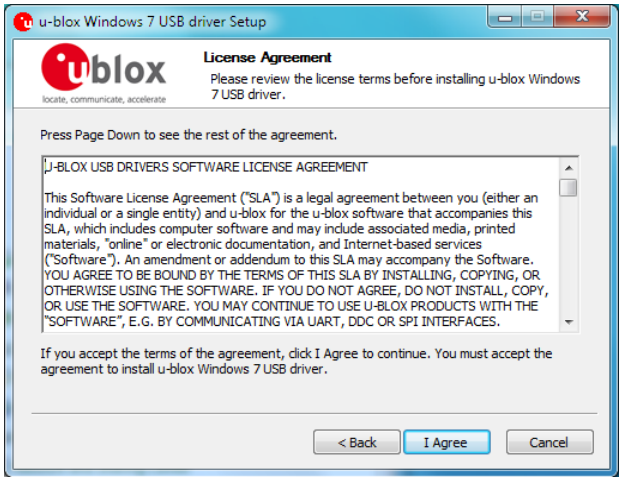
This section explains the installation of both Sensor driver and Virtual COM Port (VCP) driver with the installer.

1) Download the installer though the following link :

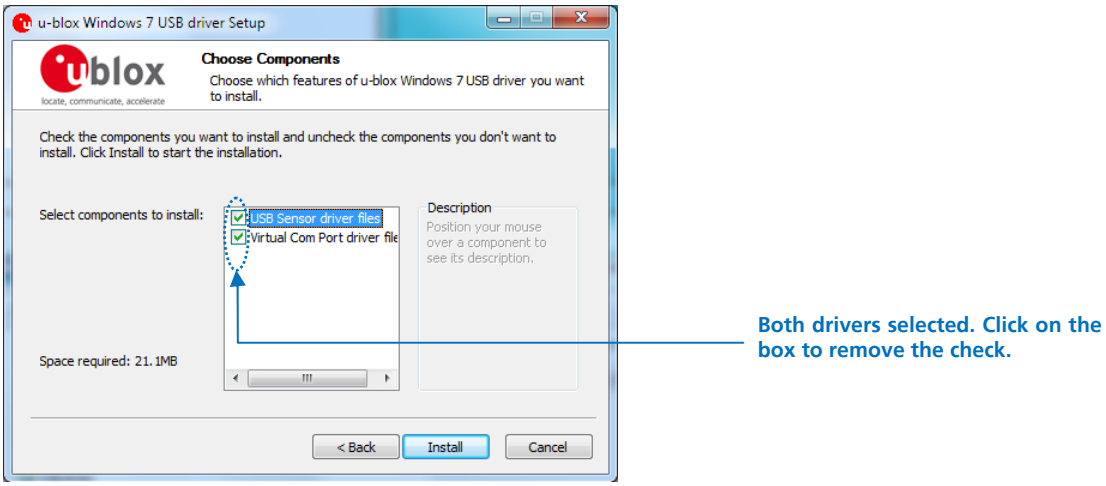
   http://www.u-blox.com/en/usb-drivers/windows-7-driver.html

2) Double-click on the downloaded file ublox_A4_U5_USB_drv3264win7_install_UI.exe
3) On the pop-up window, select the language and then accept the License Agreement.



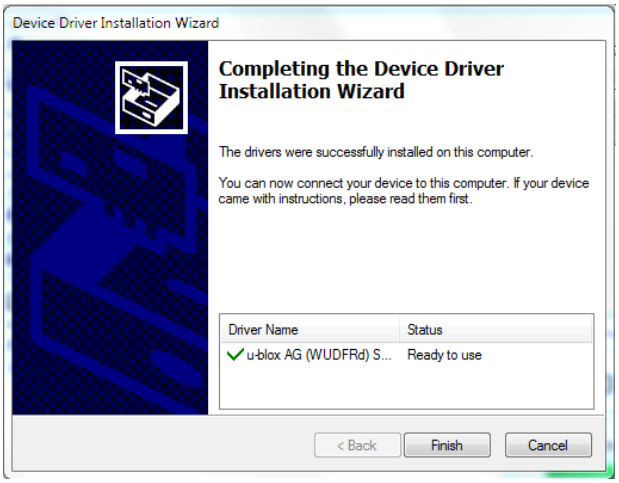




4) On the installer window as shown below, select the driver (USB Sensor driver, Virtual Com Port driver, or both like shown on this picture) to be installed.



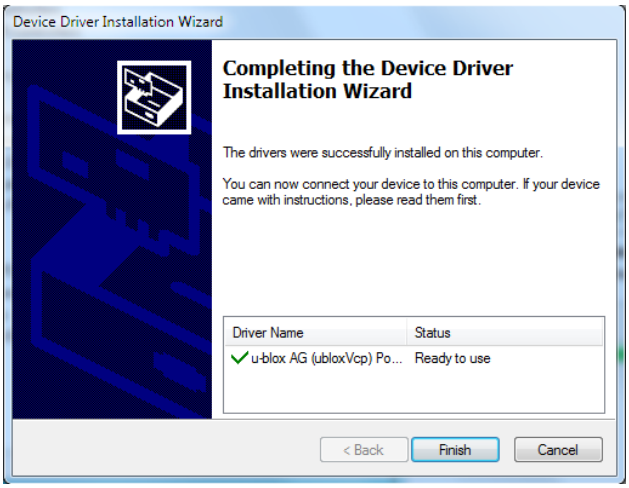

When USB Sensor driver is selected, Device Driver Installation Wizard will start installation of the USB Sensor driver first. Click on 'Next'. When only Virtual Com Port driver is selected, go to 7).

5) The window should appear as shown in the following picture. Click on 'Finish' to complete USB Sensor driver installation. When only the USB Sensor driver has been selected at step 4), installation is almost finished. Go to 8).

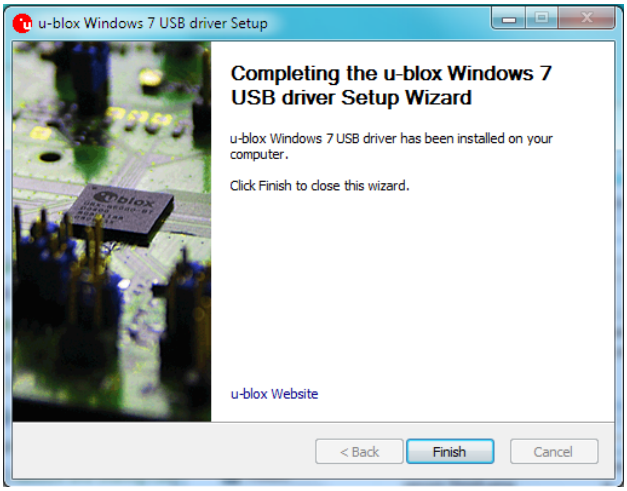



6) The Device Driver Installation Wizard starts for Virtual Com Port driver installation. Click on 'Next'. The Wizard starts the installation.

7) The window should appear as shown. Click on 'Finish' to complete the driver installation. At this stage, only the driver is installed but the port itself still needs to be added. To add it, go to section 3.2.



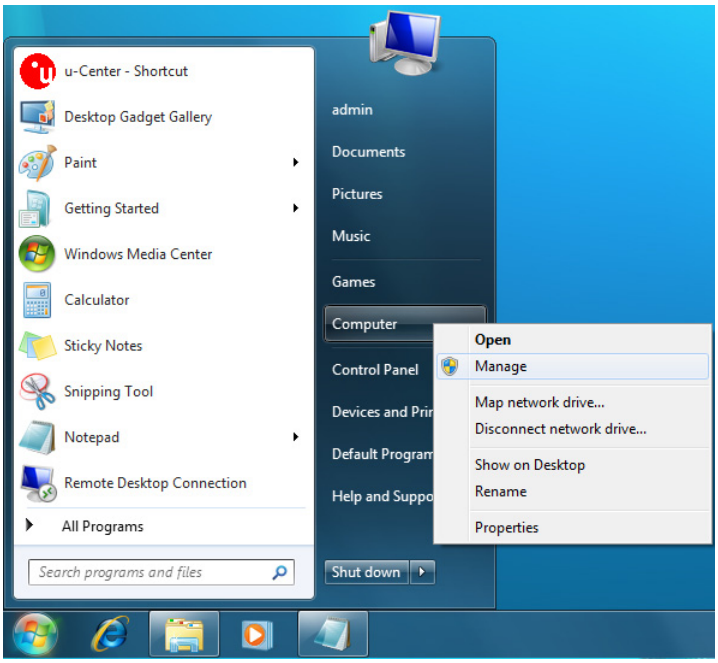

8) On the installer window as shown below click on 'Finish' to complete the driver installation.



## 3.2 Virtual COM Port installation

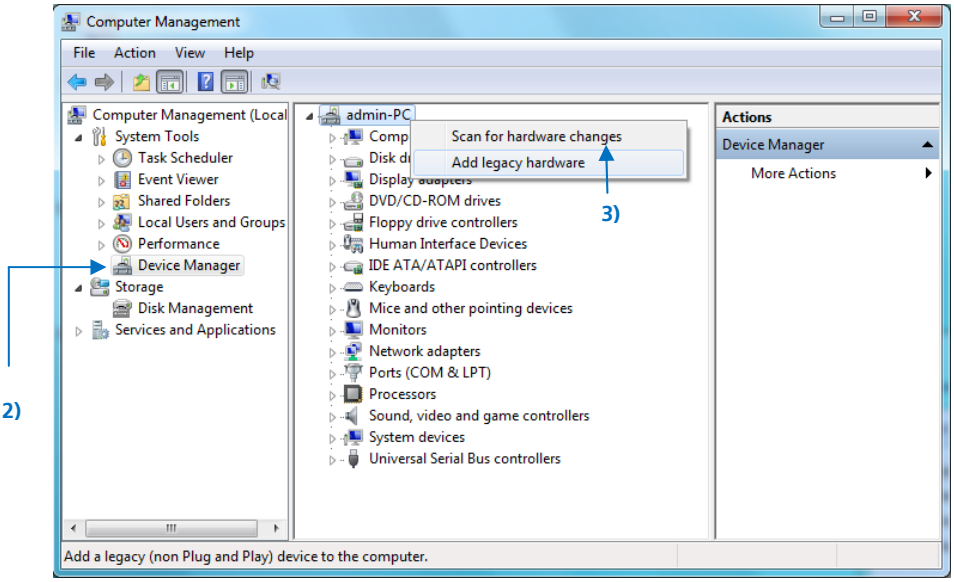
Once the Virtual COM Port (VCP) driver has been installed, it needs to be added to the Device Manager through the following procedure:

1) From the Start menu, right click on the 'Computer' icon and then select 'Manage' from the pop-up menu.




2) In the Computer Management window, select 'Device Manager' from the list of icons on the left.

3) In the main part of the window, right click on the top (root) device and then select 'Add legacy hardware'.

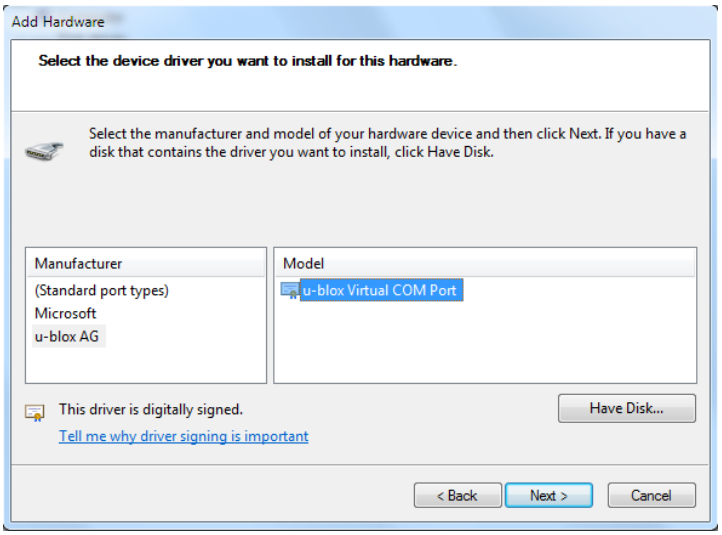



4) The device install wizard (Welcome to the Add Hardware Wizard) should start. Select 'Next'.

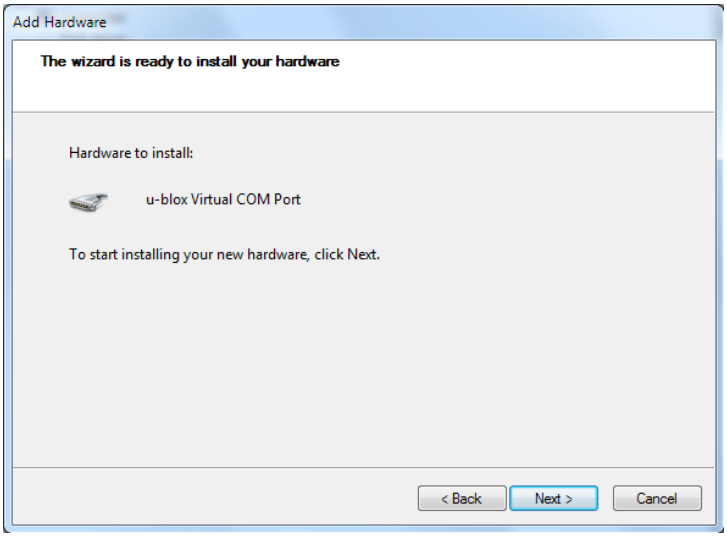
5) On the following page (The wizard can help install other hardware), choose "Install the hardware that I manually select from a list (Advanced)" then click on 'Next'.

6) On the following page (From the list below, select the type of hardware you are installing), choose (COM & LPT) and click on 'Next'.

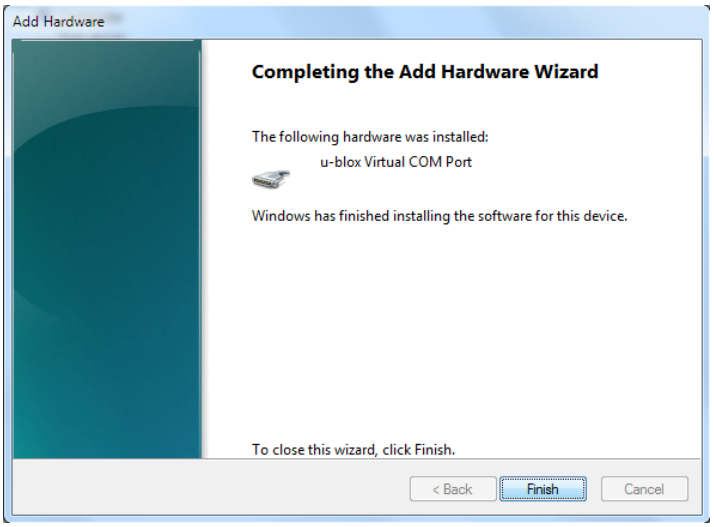
7) On the following page (Select the device driver you want to install for this hardware.), first select u-blox AG under Manufacturer. u-blox Virtual COM Port then appears under Model; select u-blox Virtual COM Port and click on Next.




8) Now the wizard is ready to install the VCP. Click on 'Finish' on the following window.



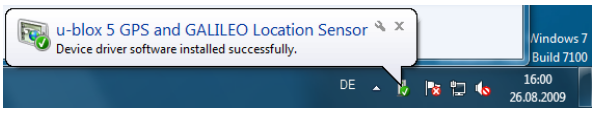

9) The window should appear as follows. Click on 'Finish'.


Add Hardware
Completing the Add Hardware Wizard
The following hardware was installed:
u-blox Virtual COM Port
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

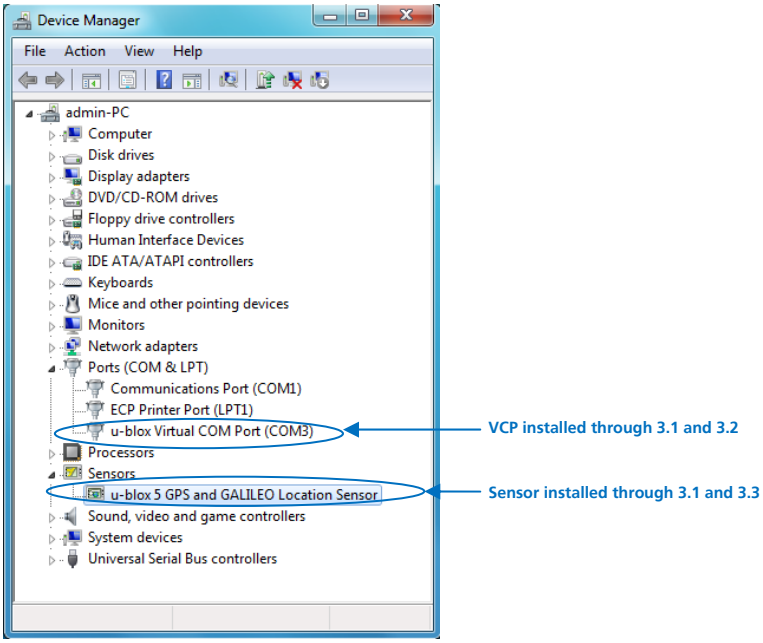
## 3.3 Connecting the GPS sensor

Once the Sensor driver has been installed (see 3.1), the device can be connected to any USB port.

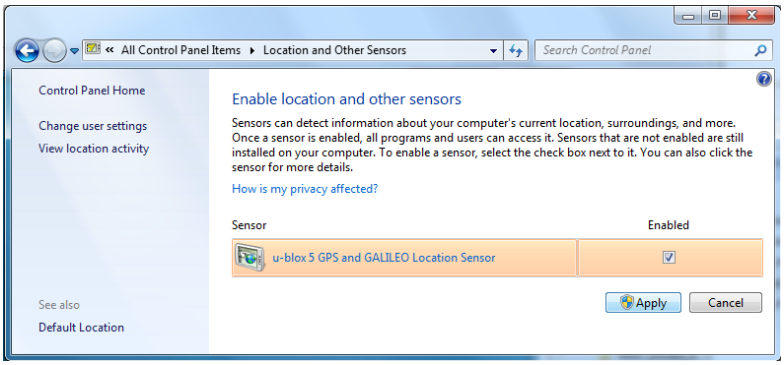
1) When the device is connected for the first time to any port, the driver is installed for the USB port, to which the device is connected, and the following message will be shown after the installation.



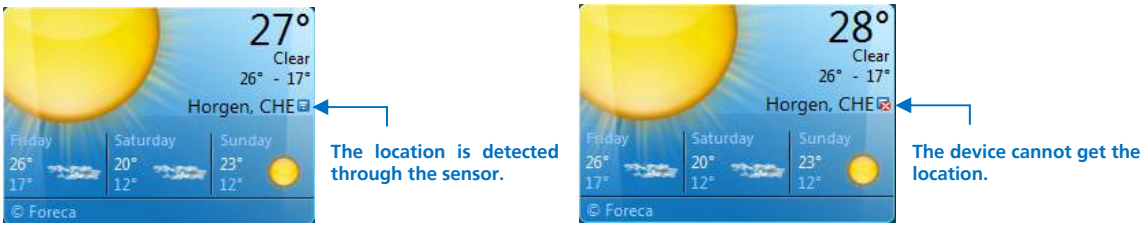

2) The installed drivers appear on the Device Manager as in the figure below.




3) The sensor needs to be enabled on Location and Other Sensors under Control Panel as shown below.

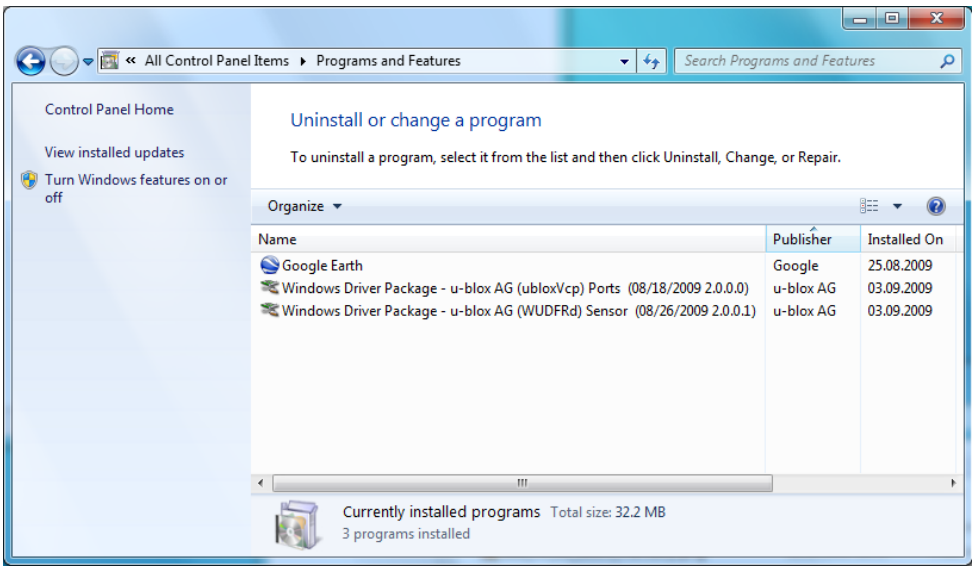



4) In order to see if the device works through the installed sensor, Weather Gadget can be used.




## 3.4 Uninstalling the drivers

1) On Program and Features, double-click on the driver package to uninstall as shown below.




2) The driver is now removed.

# Appendix A: Supported sensor data & properties

## For driver revision 2.0.0.1.

## Read only properties

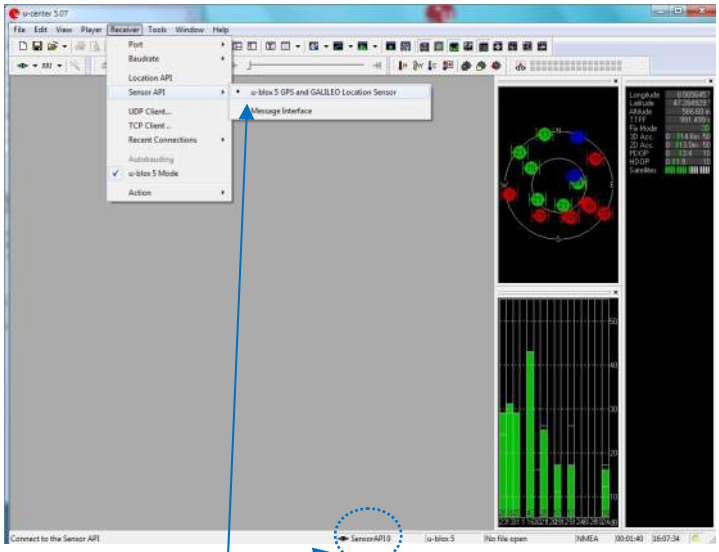
SENSOR_PROPERTY_CONNECTION_TYPE
SENSOR_PROPERTY_CURRENT_REPORT_INTERVAL
SENSOR_PROPERTY_DESCRIPTION
SENSOR_PROPERTY_FRIENDLY_NAME
SENSOR_PROPERTY_MANUFACTURER
SENSOR_PROPERTY_MIN_REPORT_INTERVAL
SENSOR_PROPERTY_MODEL
SENSOR_PROPERTY_PERSISTENT_UNIQUE_ID
SENSOR_PROPERTY_SERIAL_NUMBER
SENSOR_PROPERTY_STATE
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

## Read/Write properties

SENSOR_PROPERTY_CURRENT_REPORT_INTERVAL
SENSOR_PROPERTY_LOCATION_DESIRED_ACCURACY

# Appendix B: u-center for Windows 7

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.




**u-center Sensor API selected.**

# Related Documents

[1] u-blox GPS location sensor driver – Release note, Doc No GPS- SW-09011

[2] u-blox 5 Protocol Specification, Doc No GPS.G5-X-07003

[3] Introduction to Microsoft's Sensor and Location Platform in Windows :
http://www.microsoft.com/whdc/sensors

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

# Revision history

| Revision | Date | Name | Status / Comments |
|---|---|---|---|
| - | 03/09/2009 | svin | Initial release |

# 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 (703) 483 3184
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 China:**
Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

**Regional Office Japan:**
Phone: +81 03 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