



GPS L5 configuration

GNSS receiver handling of GPS L5 health status

Application note

Abstract

This document provides options and guidelines for configuring the receiver so that it ignores the broadcast GPS L5 health flag and overrides it with the respective GPS L1 signal health flag of the same satellite.

This document applies to u-blox GNSS receivers with GPS L5 support.

Document information

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1 Overview of GPS L5 signal health status

L5 is the third civilian GPS signal, designed to meet the demanding requirements of many high-performance applications. It features higher power, greater bandwidth, and an advanced signal design. L5 provides the most advanced civilian GPS signal to users worldwide.

Broadcasting of Civil Navigation (CNAV) messages on the L5 signal began in April 2014. At the time of writing, GPS L5 signals remain **pre-operational** and should be employed at the user's own risk until declared operational.

 Pre-operational GPS L5 signals should not be used for safety-of-life or other critical purpose.

Pre-operational signals are set unhealthy until sufficient monitoring capability is established and as such are not used by u-blox receivers as a default. GPS L5 signals are currently broadcasted by 18 GPS satellites (as of June 15, 2023).

2 Background


GPS L5 signals are broadcasted as unhealthy. At the same time, the user application may have interest in evaluating these signals and be ready for when they become fully operational.

This is an operational issue concerning the satellites / space segment and not a limitation or specific configuration of u-blox products.

With this unhealthy status being broadcasted, it is difficult to assess the signal performance for evaluation and testing purposes. This calls for a solution to have a configuration setting to overcome the GPS L5 unhealthy status to interested customers.

2.1 Solution

The current solution is to configure the receiver to ignore the GPS L5 signal health status and override it with the respective GPS L1 signal health status of the same satellite, as explained in section 3.

 Customers who choose to ignore the GPS L5 signal health status in their production system do so at their own risk and must be fully aware of the implications. The system should also include a mechanism to revert to the mode where the L5 signal health status is acknowledged.

u-blox does not recommended to use these configurations in safety-of-life or other critical systems.

3 Setting the required configuration

The binary UBX configuration message enables configuration of the receiver behavior with respect to the GPS health status. The configuration can be stored in RAM, BBR (battery-backed RAM), and flash.

Writing to RAM ensures the UBX messages are taken into use immediately. Writing to BBR allows the UBX message to be carried out at next power-on if battery backup is maintained.

Writing to flash ensures the UBX message is taken into use at every startup until the firmware is replaced in flash.

3.1 u-blox products

The receiver does not use unhealthy signals for navigation by default. To ignore the GPS L5 signal health status and override it with the respective GPS L1 signal health status, the following UBX binary strings can be used.

Configuration layer	UBX messages
RAM	B5 62 06 8A 09 00 00 01 00 00 01 00 32 10 01 DE ED
BBR	B5 62 06 8A 09 00 00 02 00 00 01 00 32 10 01 DF F5
Flash	B5 62 06 8A 09 00 00 04 00 00 01 00 32 10 01 E1 05

Table 1: UBX binary string to override GPS L5 health status with GPS L1 health status

To revert to default behavior, send

Configuration layer	UBX messages
RAM	B5 62 06 8A 09 00 00 01 00 00 01 00 32 10 00 DD EC
BBR	B5 62 06 8A 09 00 00 02 00 00 01 00 32 10 00 DE F4
Flash	B5 62 06 8A 09 00 00 04 00 00 01 00 32 10 00 E0 04

Table 2: UBX binary strings to revert the GPS L5 health status monitoring to default

To confirm that the above UBX messages are sent successfully to the receiver, check that you receive a UBX-ACK-ACK message afterwards.

3.2 Using u-center to send binary strings

You can use the u-center GNSS evaluation software for Windows to send the binary command strings to the receiver for u-blox F9 products. u-center is available from u-blox website at <https://www.u-blox.com/en/product/u-center>.

To send the binary command strings to the receiver, first open the Messages View in u-center by pressing F9 or by selecting “Messages View” under “View” menu. Then select CUSTOM message type as shown in Figure 1, paste the binary command string to the window, and finally press “Send” at the bottom of the window.

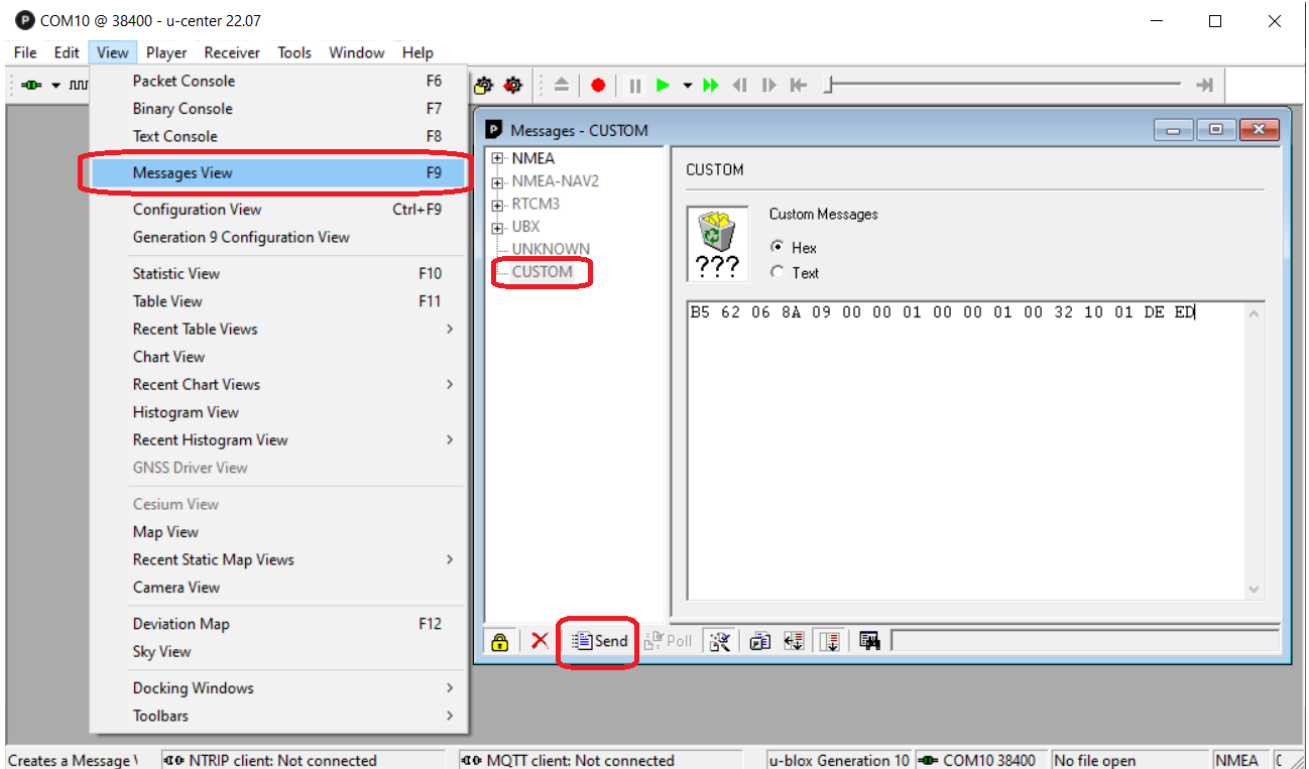


Figure 1: u-center user interface for sending binary strings

3.3 Using u-center 2 to send binary strings

You can use the u-center 2 GNSS evaluation software for Windows to send the binary command strings to the receiver for u-blox F10 products. u-center 2 is available from u-blox website at <https://www.u-blox.com/en/u-center-2>.

To send the binary command strings to the receiver, first open the “Tools and Services” on the left in u-center 2 as shown in Figure 2. Then select “Hex utilities”, paste the binary command string to the window, acknowledge that the user is aware of the implications, and finally press the “Send” bottom.

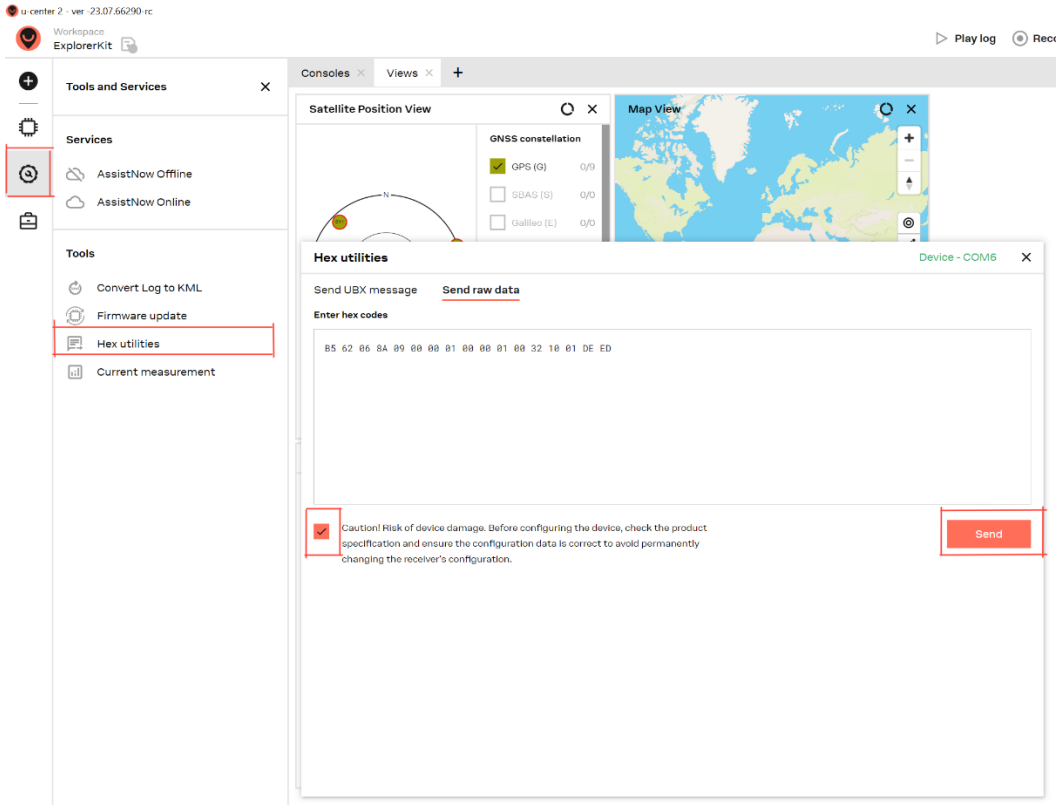


Figure 2: u-center 2 user interface for sending binary strings

Appendix

A Glossary

Abbreviation	Definition
ACK	UBX message received and executed acknowledge
BBR	Battery Backed RAM
Flash	EEPROM (electronically erasable programmable read-only memory)
RAM	Random Access Memory

Table 3: Explanation of the abbreviations and terms used

Revision history

Revision	Date	Name	Comments
R01	15-09-2021	apai	Initial release
R02	20-07-2023	angi	Editorial and added u-center screenshots
R03	04-09-2023	angi	Include F10 products and u-center 2

Contact

For further support and contact information, visit us at www.u-blox.com/support.