GPS L5 configuration

Addressing 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 F9 GNSS receivers with GPS L5 support. This application note is for evaluation and testing purposes only.

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Document information

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Disclaimer: The application note is for evaluation and testing purpose only.

Contents

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 civil navigation (CNAV) messages on the L5 signal begun 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. GPS L5 signals are currently broadcasted by 16 GPS satellites (as of June 15, 2021).

u-blox provides the configurations instructed in this application note to allow customer evaluation of GPS L5 signals while they still are unhealthy. It is not recommended to use these configurations in production systems.

2 Background

GPS L5 signals are still scheduled to be broadcast as unhealthy for a few years. At the same time, the user application may have interest in evaluating these signals, to be ready when they become fully operational.

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

With this unhealthy status in place 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.

Again, u-blox provides the configurations instructed in this application note for customer evaluation and testing purposes only.

3 Setting required configuration

The binary UBX configuration message allows configuring the receiver behavior with respect to the GPS health status, and 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 List of UBX message options

Note that the GPS L5 signals broadcast at the time of this release are flagged as unhealthy. The receiver does not use unhealthy signals for navigation. 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.

These strings should be used at user's own risk for evaluation and testing purposes only. They should not be used in production systems.

Configuration layer	UBX messages
RAM	B5 62 06 8A 09 00 00 01 00 00 01 00 32 10 01 DE ED
BBRAM	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
BBRAM	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 to default

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

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

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
Email: info_us@u-blox.com

Regional Office West Coast:

Phone: +1 408 573 3640
Email: info_us@u-blox.com

Technical Support:

Phone: +1 703 483 3185
Email: support@u-blox.com

**Headquarters
Europe, Middle East, Africa**

u-blox AG

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

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.

Phone: +65 6734 3811
Email: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office Australia:

Phone: +61 3 9566 7255
Email: info_anz@u-blox.com
Support: support_ap@u-blox.com

Regional Office China (Beijing):

Phone: +86 10 68 133 545
Email: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Chongqing):

Phone: +86 23 6815 1588
Email: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shanghai):

Phone: +86 21 6090 4832
Email: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office China (Shenzhen):

Phone: +86 755 8627 1083
Email: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office India:

Phone: +91 80 405 092 00
Email: info_in@u-blox.com
Support: support_in@u-blox.com

Regional Office Japan (Osaka):

Phone: +81 6 6941 3660
Email: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Japan (Tokyo):

Phone: +81 3 5775 3850
Email: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea:

Phone: +82 2 542 0861
Email: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan:

Phone: +886 2 2657 1090
Email: info_tw@u-blox.com
Support: support_tw@u-blox.com